

The millipede genus *Lissodesmus* Chamberlin, 1920 (Diplopoda: Polydesmida: Dalodesmidae) from Tasmania and Victoria, with descriptions of a new genus and 24 new species

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Abstract

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Lissodesmus includes *L. adrianae* Jeekel, 1984, *L. alisonae* Jeekel, 1984, *L. modestus* Chamberlin, 1920 (type species) and *L. perporosus* Jeekel, 1984 from Tasmania, *L. martini* (Carl, 1902) from Victoria, and 23 new species: *L. anas*, *L. bashfordi*, *L. clivulus*, *L. cognatus*, *L. cornutus*, *L. devexus*, *L. hamatus*, *L. horridomontis*, *L. inopinatus*, *L. latus*, *L. montanus*, *L. orarius*, *L. peninsulensis* and *L. plomleyi* from Tasmania, and *L. blackwoodensis*, *L. catrionae*, *L. dignomontis*, *L. gippslandicus*, *L. johnsi*, *L. macedonensis*, *L. milledgei*, *L. otwayensis* and *L. tarrabulga* from Victoria. The new genus *Tasmanopeltis*, close to *Lissodesmus*, is erected for *T. grandis* sp. nov. from Tasmania.

Keywords

Diplopoda, Polydesmida, Dalodesmidae, millipede, Australia, Tasmania, Victoria, spiracles, sphaerotrichomes

Introduction

Tasmania and Victoria are home to a diverse group of dalodesmid Polydesmida with well-developed paranota, a long dorsal seta near the posterior corner of each paranotum (Fig. 1) and fairly uniform gonopod structure. Currently all such forms are referable to either *Lissodesmus* Chamberlin, 1920 or *Dasystigma* Mesibov, 2003. In this paper I place 14 new Tasmanian and nine new Victorian species in *Lissodesmus*. The expanded genus is far from homogeneous, but it is not yet clear how it should be divided into monophyletic subgroups. An unusual form from north-eastern Tasmania is placed in *Tasmanopeltis* gen. nov., close to *Lissodesmus*.

Characters. Tasmanian and Victorian dalodesmids with a head + 20 segments, well-developed paranota and a long posterior corner seta (Fig. 1) are here called the “*Lissodesmus* group”. All species have four main branches or processes on the gonopod telopodite arranged as shown in Fig. 2. In naming these processes I follow Jeekel (1983, 1984), but Jeekel’s “solenomerite” is here “solenomere”. This is the mesal or anteromesal process in which the prostatic groove terminates. In *L. martini* (Carl, 1902) it was called the “principal branch” (*Hauptast*) by Carl (1902) and the “seminal groove branch” (*Samenrinnenast*) by Attems (1940), while Chamberlin (1920) called it the dorsal branch of the mesal spur in *L. modestus* Chamberlin, 1920.

The telopodite continues distally from the solenomere origin as the prefemoral process (**pf**) (Carl: “neighbouring branch” (*Nebenast*); Attems: “tibiotarsal branch” (*Tibiotarsalast*)). Arising on the lateral or anterolateral side of the prefemoral process is the femoral process (**f**) (Carl: “secondary branch” (*sekundärer Ast*) of the “neighbouring branch”; Attems: “short side branch” (*kurzer Seitenast*)). Finally, arising posterior to the solenomere is the tibiotarsus (**tt**) (Chamberlin: ventral branch of the mesal spur; Attems: “spine” (*Dorn*)).

The process names as used here are only conventional labels. Because the development of the telopodite in male Polydesmida is so abrupt and so cryptic, it is not certain that the processes are homologous with the podomeres suggested by the process names, i.e. prefemur, femur, tibia and tarsus.

In addition to the main telopodite processes, most species in the *Lissodesmus* group have at least one mesolaterally flattened projection on the posterior surface of the prefemoral process. In accord with Jeekel (1984) this projection is here called an “uncus” (**u** in Fig. 2), although it is not always hook-shaped.

As background to a discussion of classification in the *Lissodesmus* group, I review here a number of characters, beginning with the telopodite processes. Apart from *L. adrianae* Jeekel, 1984, *L. alisonae* Jeekel, 1982, *L. martini* (Carl, 1902), *L. modestus* Chamberlin, 1920 and *L. perporosus* Jeekel, 1984, all *Lissodesmus* species mentioned in this section are new species described below.

Solenomere. The solenomere is the least variable of the telopodite processes. It typically arises at one-third to half the length of the telopodite on the anteromesal surface, bending posteriorly and often lying at the bend on a broad indentation in the telopodite body. The prostatic groove typically enters the solenomere on its anterior side near its base, then abruptly curves to run on the posteromesal side, terminating at the solenomere's fine, generally truncated tip. The solenomere varies very little in size relative to the telopodite as a whole from species to species. In most species the solenomere is directed distally or posterodistally, but in *L. devexus* (Fig. 32) it points posteriorly. A small structure like a toothed half-collar is found in some species on the anterior or anteromesal side of the solenomere close to its tip (e.g. in *L. martini*, Fig. 50). This structure is reduced to a small, pointed projection in some species (e.g. *L. modestus*, Fig. 53) and is absent in *L. adrianae*, *L. devexus*, *L. horridomontis*, *L. peninsulensis*, *T. grandis* and all four *Dasystigma* species (Mesibov, 2003b). The most unusual solenomeres are found in *L. peninsulensis*, in which the solenomere curves helically (Fig. 60), and in *L. tarabulga*, which in place of a subapical projection has a large, stout process arising about midway along the solenomere on its anterior side (Fig. 66).

Prefemoral process. The tip of the prefemoral process generally bends posteriorly. The amount of bending varies from a slight curvature in *L. peninsulensis* (Fig. 61) to a 180° turn in *L. catrionae* (Fig. 22). In *L. adrianae* (Fig. 12) and *L. modestus* (Fig. 53), the tip is erect. In *L. dignomontis* (Fig. 35) and *L. johnsi* (Fig. 45) the tip is completely unarmed but in other species it bears teeth or tooth-like projections in a wide range of sizes, shapes, positions and orientations, and the process in many species ends in an elaborate comb (e.g. in *L. macedonensis*, Fig. 48). In most species the tip of the prefemoral process is undivided. The tip is broadly divided in *L. orarius* (Fig. 57) and forked in *L. bashfordi* (Fig. 17). In *L. hamatus* (Fig. 39), *L. horridomontis* (Fig. 41), *L. inopinatus* (Fig. 43) and *L. otwayensis* (Fig. 59) the distal portion of the process is abruptly shifted laterally, with a low "shoulder" projection marking the mesal end of the bend. In *T. grandis* (Fig. 68) this "shoulder" is larger and projects distally as a separate sub-process. The prefemoral process varies in length and armature in *L. devexus* (Figs 32, 33), but in other species these two features are more stable.

Femoral process. The most complex femoral processes are found in *Dasystigma* species, in which the process is variously divided near its tip and armed (Mesibov, 2003b). In other species the process is typically a smooth, bluntly pointed bar or blade, often with a posterior branch (e.g. in *L. alisonae*, Fig. 14). In *T. grandis* (Fig. 68) the tip of the femoral process is expanded and carries a few blunt projections. *Lissodesmus* group species also vary in where the femoral process originates on the telopodite, i.e. proximal or distal to the solenomere origin. In four species the femoral process extends distally as far as the tip of the prefemoral process: *L. bashfordi* (Fig. 18), *L. dignomontis* (Fig. 35), *L. johnsi* (Fig. 45) and *L. modestus* (Fig. 52). Whether the femoral process in these species has become a functional adjunct of the prefemoral process is unknown.

Tibiotarsus. In most species the tibiotarsus is a simple rod directed posterodistally, but in *L. devexus* the process is directed posterobasally (Fig. 32). The tibiotarsus originates just posterior to the solenomere in all but the four *Dasystigma* species, in which the origin is much further lateral, roughly halfway around the telopodite body towards the origin of the femoral process. The tip of the tibiotarsus is expanded and turned distally in a number of species, and in *L. catrionae* (Fig. 22), *L. cornutus* (Fig. 30), *L. horridomontis* (Fig. 41) and *L. montanus* (Fig. 55) the tip is armed with blunt, tooth-like, marginal projections. A curious feature of the tibiotarsus in *L. devexus* is a series of annular "wrinkles" visible at high magnification (Fig. 31). The "wrinkles" give the impression that the tibiotarsus has been compressed along its long axis before the cuticle had thoroughly hardened. In *L. johnsi* (Figs 44, 45) the tibiotarsus is fan-shaped and marginally toothed.

Uncus. Many species have a single small uncus similar to the one shown schematically in Fig. 2, and some have several mesolaterally flattened projections in the same region, i.e. between the solenomere origin and the tip of the prefemoral process. Because these processes vary in shape, number and position, it is not clear whether they should be considered homologous, e.g. whether either or both of the small, ridgelike projections in *L. perporosus* (Figs 62, 63), partway along the prefemoral process on its posterior surface, are developmentally equivalent to the large, arcuate structure in *L. peninsulensis* (Fig. 61). Assuming homology, the most variable and unusual uncus is found in *L. devexus* (Figs 32, 33). In specimens from the type locality the uncus is a long, blade-like structure parallel to the tip of the prefemoral process, while in specimens from a nearby locality the uncus is merely a low ridge with a slightly hook-shaped tip.

Telopodite setae. All species have sparse, long setae on the posterior surface of the proximal portion of the telopodite. The most distal setae are typically at the level of the solenomere origin or just beyond. In *L. otwayensis* a row of large setae continues distally almost to the level of the uncus (Fig. 58), and in *L. adrianae* the most distal setae are close to the apex of the prefemoral process (Fig. 11).

Body size. Overall length ranges from c. 11 to c. 35 mm, but length measurements of preserved specimens are affected by the degree to which each prozonite is telescoped into the next metazonite headwards. The size measure used here, *H*, is the height of segment 12 as viewed from the rear (see Fig. 3), i.e. in the plane of the posterior edge of the metazonite. *H* was measured ± 0.1 mm on a male of each species judged to be typical; see remarks on individual species for comments on within-species variability. Between species *H* varies from 1.2 to 3.3 mm.

Antennomeres. Chamberlin (1920: 135) observed that the antenna in *L. modestus* had "the second and sixth articles longest, the third a little shorter, the fourth and fifth much shorter". In redescribing *L. modestus* from topotypical material, Jeckel (1984) measured the relative lengths of antennomeres 2 to 6 as 1.00, 0.90, 0.65, 0.65 and 0.85 and commented: "In his description Chamberlin stated that the 2nd and 6th antennomeres are the longest with which present observations do not agree. It seems possible that Chamberlin

actually meant the length of the 2nd and 6th to 8th antennomeres" (p. 94). I have not seen Jeekel's material, but I have examined the *L. modestus* holotype and Chamberlin's description is correct. The difference between the two descriptions is almost certainly due to differences in the degree to which the antennomeres are telescoped in the preserved specimens, and in how antennomere length was measured. Antennomere proportions vary little in the *Lissodesmus* group (Fig. 69; see also Fig. 2 in Mesibov, 2003b), with antennomere 2 slightly longer than or about equal to 6, followed by 3, then by the more or less equal 4 and 5; antennomere 6 is invariably the widest.

Paranota. The size, shape and setation of paranota vary from anterior to posterior within individual specimens in the *Lissodesmus* group, as elsewhere in the Polydesmida. Differences can also be seen when comparing the same segment from individual to individual: in the shape of the paranotal margin as viewed from above; in the degree of "inflation" of the paranota in a transverse section of the segment; in the number, position and degree of definition of marginal notches; and in the presence/absence of setae associated with the notches. This variation devalues some paranotal characters for separating species. However, the ratio *R* of paranotal width to prozonite width (Fig. 3) is useful. In the 29 species considered here, *R* of segment 12 ranged from 1.3 ("reduced paranota") to 1.8 ("wide paranota"). Maximum prozonite width is tightly correlated ($r^2 = 0.96$; $n = 29$) with *H* in individual specimens, but *R* is apparently not correlated with *H* between species. A second useful paranotal character is the degree to which the posterior corner is turned up (Figs 4, 28). Turned-up corners are associated with reduced relative width, occurring in all five species with *R* = 1.3, two of the eight species with *R* = 1.4 and two of the 13 species with *R* = 1.5.

Ozopores. The pore formula is normal for head + 20 segment Polydesmida, i.e. ozopores on segments 5, 7, 9, 10, 12, 13, 15–19, except for *L. perporosus*, which has the formula 5, 7, 9–19. Ozopores open dorsolaterally near the paranotal margin, more or less close to the posterior corner (Fig. 70).

Spiracles. In most *Lissodesmus* species the spiracles are as shown in Fig. 5A for *L. modestus*. They have thick and rounded rims, small apertures, and no projecting structures. On each diplosegment the anterior spiracle opens just above the coxa of the anterior leg, with a thin shelf-like projection of the body wall separating the two. The posterior spiracle opens about midway between the anterior and posterior legs. In both sexes in *Dasystigma* species and in *Tasmanopeltis grandis* (Fig. 5B) the spiracle rims are very thin and the aperture relatively wide, and a dense mass of hair-like structures projects from the opening. Further, the posterior spiracle lies immediately adjacent to the anterior spiracle in *T. grandis* and in *D. bonhami* Mesibov, 2003 (Mesibov, 2003b, Fig. 5A) and *D. margaretae* Mesibov, 2003 (Mesibov, 2003b, Fig. 5C, D). Stadium 5 *T. grandis* have spiracles of normal appearance and at normal spacing; the spiracles become progressively "hairier" and closer together in stadia 6, 7 and 8. In both sexes of *L. anas* (Fig. 5C), a dense mass of hair-like structures obscures the spiracle openings. The size, shape and position of the *L. anas* spiracles are seen in cleared preparations to be the same as in *L. modestus*. A small clump of hair-like structures arises from

the body wall just posterior and ventral to the posterior spiracle (just visible in Fig. 5C). Just anterior and ventral to the anterior spiracle, a long, rigid "fox tail" of hair-like structures arises and extends posteriorly almost to the posterior spiracle. Many of the hair-like structures associated with both spiracles are forked near their base. The "fox tail" structure has not, to my knowledge, been noted elsewhere in the Diplopoda. I have not seen stadium 6 or younger *L. anas*, but a less well-developed anterior "fox tail" and posterior clump are present in stadium 7.

Limbus. Under relatively low magnification (200 $\times$), the limbus appears to be composed of simple, straight elements. Under higher magnification the elements in *L. latus* are seen to be strongly tapering structures (Fig. 6A), while in *L. hamatus* each tapering element has a row of sharp, posteromesally directed teeth on the mesal surface (Fig. 6B). The limbus in other species has not been examined at high magnification.

Epiproct. In most *Lissodesmus* group species the epiproct ends in two short, well-separated, rounded bumps (Fig. 7A). The projections are longer in some *Lissodesmus* species (Fig. 7B), giving the epiproct a forked appearance even at low magnification.

Podomeres. As usual for Polydesmida, legs close to the gonopods in *Lissodesmus* group males are greatly swollen compared to the corresponding legs in females. The prefemur has a rounded dorsal projection, and some dorsal expansion is usually also seen on the femur (Fig. 71). Species differ in the degree of swelling, e.g. *L. anas* (Fig. 71ana) has slender legs and *L. macedonensis* (Fig. 71mac) has thick, robust ones. In some species the tarsus is shorter than the femur (e.g. *L. horridomontis*, Fig. 71hor), in others the same length (e.g. *L. perporosus*, Fig. 71per), and in still others distinctly longer (e.g. *L. peninsulensis*, Fig. 71pen). Tibiae are also variable, with a ventral, distal swelling apparent in some species (e.g. *L. modestus*, Fig. 71mod).

Sphaerotrichomes. I presented some preliminary observations on male leg setae (Mesibov, 2004a) and reported that beginning with leg 3, most legs in male *L. modestus* have sphaerotrichomes on the prefemur, femur, postfemur, tibia and tarsus. An erratum noted that sphaerotrichomes were present only on the tibia and tarsus in *L. modestus*. However, my original observations were correct (Fig. 8A), and sphaerotrichomes can, in fact, be seen on the *L. modestus* femur in Fig. 2G of Mesibov (2004a). The same error was made by Jeekel (1984) in his redescription of *L. modestus* ("globular setae on tibia and tarsus", p. 93), and by Johns (1964) in his revision of *Pseudopronopeltis*, including what is now *L. martini*. In my own case the error arose because I habitually viewed legs from the side, and in this orientation the dense "brush" setae on the proximal podomeres can hide sphaerotrichomes lying mainly on the midventral line. The true distribution of sphaerotrichomes can be revealed using scanning electron microscopy, or by clearing the leg (e.g., with 60% lactic acid) and viewing it from beneath with a light microscope and substage illumination. Sphaerotrichome numbers and distributions vary from leg to leg (Mesibov, 2004a). For the present study I cleared and examined leg 6 from one male of each of the 29 species under consideration. Sphaerotrichomes were found on the prefemur, femur, postfemur, tibia and tarsus of 24 species, but in some

cases "presence" on the prefemur amounted to only one or two sphaerotrichomes. Sphaerotrichomes were seen on the tarsus and tibia only in *L. devexus* and *L. milledgei*; on the tarsus, tibia and postfemur in *L. cornutus* and *L. horridomontis*; and on the tarsus, tibia, postfemur and femur in *L. orarius* (Fig. 8B). Absence of sphaerotrichomes from podomeres was clearly correlated with a lower total number of sphaerotrichomes on the leg, indicating that absence from some leg 6 podomeres in the five named species results from variation in a quantitative character. A similar quantitative variation is seen in individual specimens: the total number of sphaerotrichomes per leg decreases from leg 3 rearwards, and the last legs typically have sphaerotrichomes on tibia and tarsus only. In most *Lissodesmus* species the sphaerotrichome shafts are gradually tapered, as shown for *L. modestus* in Fig. 2D in Mesibov (2004a), but in some species, e.g. *L. martini*, the tips of the shafts are slightly expanded, as in *Bromodesmus* species (Fig. 2B in Mesibov, 2004a).

"Furriness". The new species *L. cognatus* and *L. latus*, are "furry" in portions of their respective ranges. The "fur" (Fig. 9B) consists of long, thin setae sparsely distributed on the collum and metatergites of all males and females collected in these areas (for locations, see remarks on the respective species). Furry individuals have the usual complement of longer setae on the head, the anterior portion of the collum and the posterior portion of the preanal segment. Differences between the gonopods of furry and typical forms are minor. The functions of the fur are unknown; furry specimens are found in the same microhabitats as non-furry forms.

Juvenile stadia. The typical pattern of paranotal development in the *Lissodesmus* group is shown in Fig. 10 for *L. perporosus*. Stadium 5 and younger individuals have prominent teeth armed with setae on the lateral and posterior margins. As the individual matures, the lateral teeth are progressively reduced to marginal sections delimited by small notches. All or most of the lateral setae are lost; the most anterior of the lateral setae is the one most frequently retained (Fig. 70). The posterior marginal teeth disappear in most species but are retained in stadium 8 of Tasmanian *L. latus* and Victorian *L. blackwoodensis*, *L. dignomontis*, *L. gippslandicus*, *L. johnsi*, *L. macedonensis*, *L. martini* and *L. tarrabulga* (Fig. 70). The lateral margin of the paranotum is typically straight and parallel to the longitudinal body axis in early stadia, curving as the individual matures (Fig. 10).

Classification

Jeckel (1984) reviewed the six species then known in the *Lissodesmus* group: *L. adrianae*, *L. alisonae*, *L. margaretae*, *L. martini*, *L. modestus* and *L. perporosus*. The gonopod structure generalised in Fig. 2 clearly set these six species apart from the other dalodesmids with a head + 20 segments known at the time from Tasmania and Victoria, namely *Gasterogramma psi* Jeckel, 1982, *Gephyrodesmus cineraceus* Jeckel, 1983 and *Tasmanodesmus hardyi*. Jeckel (1984) applied to that concept the oldest available name, *Lissodesmus*.

There are now 33 species in the group, and some subgrouping is apparent. It is less clear how to translate that structure

into genera (or subgenera, which in myriapodological practice are often "holding bays" for future genera). There are few useful non-sexual characters, and gonopod character states seem to be almost randomly mixed through the group. I have therefore looked for discontinuities: multi-character morphological gaps between species.

Four species of *Dasystigma* were distinguished by an unusually wide separation between solenomere and tibiotarsus, by the presence of hair-like structures in the spiracles, and by a close similarity in body size and colour, overall gonopod structure and paranotal form (Mesibov, 2003b). Here a new genus is erected for *Tasmanopeltis grandis*, remarkable for its exceptionally large size, spiracles with hair-like structures, process origins unusually far distal along the telopodite, and a unique, large, distal projection on the prefemoral process.

The other species in the *Lissodesmus* group include many which look to be closely related (i.e., have similar gonopods) and occur in the same region, e.g. *L. dignomontis*, *L. johnsi* and *L. tarrabulga* in Gippsland, and *L. bashfordi* and *L. modestus* in south-east Tasmania. However, I here leave *Lissodesmus* as a heterogeneous assemblage of 28 species. It thus joins *Icosidesmus* in New Zealand (Johns, 1964) and *Gnomeskelus* in southern Africa (Lawrence, 1953, 1958) as an unresolved knot of relationships in Dalodesmidae. If Shelley (1990a) is correct, it adds to a long list of large, "difficult" genera in many other millipede families. *Lissodesmus* may not be the largest such group in the south-east Australian Polydesmida; *Tasmaniosoma* Verhoeff, 1936 contains a similarly puzzling diversity of forms (Mesibov, in preparation).

Ecology and life history

In Tasmania, species in the *Lissodesmus* group are found in moist leaf litter, in and under rotting wood, under stones, in the upper layers of richly organic soil and in the moist skirt of rotted bark, twigs and leaves around the base of larger trees. They occur in cool temperate rainforest, wet eucalypt forest, dry eucalypt forest and subalpine woodland. They are particularly abundant in forest growing on fertile soils (e.g., those derived from Tertiary basalt). Within the Tasmanian annual rainfall range of c. 550–3500 mm they appear to be most abundant at intermediate values, c. 1000–2000 mm. *Lissodesmus* group species are occasionally found in alpine areas, grassy woodland and coastal scrub, but are only rarely seen in moorland, heathland and grassland. A few species are accidental cave inhabitants. No species have yet been found in long-established gardens of exotic plants, but *L. alisonae* and *L. perporosus* can be abundant in plantations of *Pinus radiata* (Bonham et al., 2002; Mesibov, 2005).

Victorian *Lissodesmus* species are so far known from cool temperate rainforest, wet eucalypt forest and dry eucalypt forest in areas with an annual rainfall greater than c. 800 mm. They are mainly found in well-rotted eucalypt logs and in accumulations of moist peaty material in surface depressions on such logs. In my own, limited experience, Victorian *Lissodesmus* are very rarely seen away from logs at lower elevations, but are sometimes found in leaf litter in the high country (>900 m).

Species in the *Lissodesmus* group are typically found sheltering in mixed-age aggregations. In Tasmania, life histories of *Dasystigma*, *Lissodesmus* and *Tasmanopeltis* appear to be only weakly seasonal. Throughout the year, a collector can find adults (including pairs in *copula*) and most juvenile stadia, even in subalpine habitats. Victoria has hotter and drier summers than Tasmania, and Victorian *Lissodesmus* may be more seasonal than their Tasmanian congeners.

All species in the *Lissodesmus* group are cryptic in their habits, but some Tasmanian species, notably *L. perporosus*, can be found wandering at night. Judging from gut contents, *Lissodesmus* group species feed on well-rotted wood and richly organic soil particles. Nothing is known of their parasites or predators, but small mites (unidentified) are often found on older individuals of both sexes.

Biogeography

Mesibov (2003b) reported that *Dasystigma* in Tasmania formed a mosaic complex of the kind first clearly described by Shelley (1990a, 1990b). The biogeographical situation is more complicated in Tasmanian *Lissodesmus*. While mosaics can sometimes be found (e.g. in the north-east with *L. adrianae*, *L. alisonae* and *L. hamatus*; see Mesibov, 1997), in most parts of the island species are sympatric. Three *Lissodesmus* species are commonly found at a single site. Four species (*L. anas*, *L. clivulus*, *L. latus* and *L. perporosus*) have been collected in forest adjoining Balfour in the north-west, and five *Lissodesmus* species can occur in the same patch of forest in parapatric overlap zones, such as the Weavers Creek parapatric zone in the north-east (Mesibov, 1997; *L. adrianae*, *L. alisonae*, *L. cognatus*, *L. devexus* and *L. hamatus*), which is also home to *Tasmanodesmus hardyi* and *Tasmanopeltis grandis*. Two species, *L. cognatus* and *L. devexus*, seem to have naturally disjunct areas of occurrence.

In Victoria, *Lissodesmus* distributions are mainly allopatric, but *L. blackwoodensis* and *L. macedonensis* have been found together near Blakeville, *L. gippslandicus* and *L. dignomontis* near Allambee, *L. gippslandicus* and *L. johnsi* near Yarragon, and *L. gippslandicus* and *L. tarabulga* near Balook. *L. martini* and *L. milledgei* probably co-occur near the Acheron Gap in the Yarra Ranges and at The Beeches near Marysville. Collections to date in Gippsland indicate that *L. dignomontis* and *L. johnsi* are parapatric south-west of Trafalgar, and that *L. gippslandicus* and *L. martini* are parapatric near the Narracan Creek valley.

Lissodesmus has so far been sampled at only c. 60 sites in Victoria, compared to c. 1200 sites in Tasmania for *Dasystigma*, *Lissodesmus* and *Tasmanopeltis*, but the area over which *Lissodesmus* could be expected to occur in Victoria is substantial. Including only the higher-rainfall, southern portions of the Western and Eastern Uplands, and both of the Southern Uplands blocks, I estimate this area to be 80 000 km², which is larger than Tasmania. Although much of the pre-European cover of wet forest has been lost from this area, it is likely that new species of *Lissodesmus* remain to be found in the Grampians, East Gippsland and physiographically isolated portions of the eastern highlands.

New, narrow-range species of Tasmanian *Lissodesmus* are also likely to be recognised in future, as there are female (and a few aberrant male) specimens in collections which I cannot confidently assign to any of the species described below. Several of these come from Flinders Island, which has not yet been surveyed carefully for millipedes.

Conservation

The Tasmanian species *L. clivulus*, *L. cognatus*, *L. horridomontis*, *L. orarius* and *L. peninsulensis* have extents of occurrence (range envelopes) of 300 km² or less. Nevertheless, local populations of these species are often large and well-distributed through extensive patches of native vegetation which are unlikely to be cleared in the foreseeable future. *L. montanus*, *L. peninsulensis* and *L. plomleyi* have larger ranges but seem to be naturally rare. None of these three species appears to be under threat. The range of *L. montanus* includes parts of several large, formal reserves. *L. peninsulensis* and *L. plomleyi* are both known mainly from areas of public land within which there are sizeable informal reserves of riparian forest, old-growth eucalypt forest, and steep and rocky ground. My field experience over the past 25 years is that Tasmanian *Lissodesmus* species tolerate the clearfelling, burning and regeneration of wet eucalypt forest habitat (Taylor, 1990; Mesibov, unpublished results).

Field studies aimed at establishing range boundaries and habitat preferences have so far been carried out for two Tasmanian *Lissodesmus* species. Originally thought to be rare (Mesibov, 1992), *L. orarius* was later found to be the dominant *Lissodesmus* species in coastal habitats between the Pedder and Pieman Rivers on the west coast (Mesibov, unpublished report to the Tasmanian Conservation Trust, 1993). Distribution mapping of *L. alisonae* increased the number of known localities from nine to 93, and the range envelope (minimum convex polygon) from 1551 to 4965 km² (Mesibov et al., 2002). Within its range, centred on the densely settled Tamar Valley, *L. alisonae* occurs in all native forest types as well as in native/exotic vegetation mixtures in city parks, and has recently been found to be abundant in a second-rotation *Pinus radiata* plantation (Mesibov, 2005).

Tasmania is a largely forested island, and about 40% of that forest is currently in formal reserves. The distribution of those reserves is the result, in part, of efforts to secure large, regionally representative blocks of little-disturbed native forest communities. The situation in Victoria is very different. Much of the wet native forest present when Europeans arrived in the 19th century has been cleared for agriculture or forestry plantations, and much of the surviving forest, reserved or not, has been degraded by frequent burning and weed invasion. In my field experience in Victoria, populations of *Lissodesmus* species other than *L. gippslandicus*, *L. martini* and *L. otwayensis* seem to be small and restricted to little-disturbed native forest remnants.

L. johnsi was first collected in 1890 near Trafalgar in the Latrobe Valley, probably in the area's tall, dense eucalypt forests (Adams, 1978). The area is now almost entirely covered with pasture and forestry plantations. Recent searches for

L. johnsi have so far yielded specimens from forest remnants at only two localities, both near Trafalgar and about 5 km apart.

Methods

Specimens were usually killed and preserved in 70–80% ethanol. For some species, vouchers preserved for molecular analysis in 95% ethanol have been deposited in QVM. Preliminary drawings on graph paper were made using an eyepiece grid; the grid was calibrated for measurements of body parts. Gonopods and male sixth legs were cleared and temporarily mounted in 60% lactic acid; other body parts were temporarily mounted in a glycerine-water mixture. A Philips Electroscan ESEM 2020 operated in high-vacuum mode was used to examine material which had been air-dried before sputter-coating with gold. SEM images were acquired digitally.

This review is based on more than 2000 museum samples containing more than 6500 specimens. Details of specimens other than holotypes and paratypes have been omitted from the “Material Examined” sections and are given in a separate document (“*Lissodesmus* supplement”) available on the *Memoirs of Museum Victoria* website, or from the author, or from the Curator of Zoology at the Queen Victoria Museum and Art Gallery.

In the text, Tasmanian localities are given with a UTM grid reference (Grid Zone Designation 55G) and the (calculated) equivalent latitude/longitude, in both cases with respect to the AGD66 datum. Victorian localities are given with latitude/longitude with respect to the WGS84 datum.

Abbreviations are as follows: AM, Australian Museum, Sydney, NSW; MCZ, Museum of Comparative Zoology, Cambridge, Mass., USA; NMV, Museum Victoria, Melbourne, Vic.; QVM, Queen Victoria Museum and Art Gallery, Launceston, Tas.; TM, Tasmanian Museum and Art Gallery, Hobart, Tas.; WAM, Western Australian Museum, Perth, WA.

Taxonomy

In the case of millipedes distinguished primarily by gonopod differences, keys and species diagnoses are necessarily verbose and often very hard to understand, even for a specialist. The most taxonomically useful part of a millipede species description is the gonopod illustration, and readers are encouraged to look first at the scanning electron micrographs and line illustrations provided.

Note that in the telopodite descriptions and drawings a “mesal” view is one centred on the solenomere, “lateral” on the femoral process, “anterior” on a line roughly midway between the origins of these two processes on the anterior surface, and “posterior” on a line roughly 180° around the telopodite from “anterior”. This convention has been adopted for convenience; as seen in the SEM views, the in situ orientation of the telopodite varies considerably from species to species.

The five species *L. adrianae*, *L. alisonae*, *L. martini*, *L. modestus* and *L. perporosus* have already been carefully described by Jeckel (1983, 1984); brief, partial redescriptions and new illustrations are included here only for the sake of consistency.

Order **Polydesmida** Leach, 1815

Suborder **Dalodesmidea** Hoffman, 1980

Dalodesmidae Cook, 1896

Lissodesmus Chamberlin, 1920

Lissodesmus Chamberlin, 1920: 135.—Attems, 1940: 490.—Jeckel, 1970: 336.—Jeckel, 1983: 150.—Jeckel, 1984: 89.—Mesibov, 2003b: 198.

Pseudoprionopeltis (*Australopeltis*) Johns, 1964: 47.

Australopeltis Hoffman, 1980: 184.—Shelley et al., 2000: 86.

Type species. *Lissodesmus modestus* Chamberlin, 1920, by original designation.

Diagnosis. Small to medium-sized dalodesmids (11–23 mm long, 1.2–2.2 mm vertical diameter) with head + 20 segments, normal pore formula (except *L. perporosus*), well-developed paranota with long posterior corner seta, spiracles well-separated on diplosegments and without emergent hair-like structures. Telopodite with small mesal or anteromesal solenomere and tibiotarsus, small to large lateral or antero-lateral femoral process and large central prefemoral process; solenomere arising at one-third to one-half the telopodite height. Prefemoral process tip typically undivided; in *L. orarius* divided apically into two posteriorly directed branches.

Remarks. Chamberlin (1920) erected the monotypic genera *Lissodesmus* and *Tasmanodesmus* for the Tasmanian species *L. modestus* and *T. hardyi*. The two genera were ignored by Verhoeff (1932, 1936) on the grounds that Chamberlin had published no illustrations, and were regarded as genera of uncertain family placement by Attems (1940). Chamberlin believed the two genera were closely related, but as shown in a recent redescription (Mesibov, 2004b) *T. hardyi* is substantially different in gonopod structure from all other Tasmanian dalodesmids, and the posterior corner seta in *T. hardyi* is short and inconspicuous.

Pseudoprionopeltis martini Carl, 1902 from Melbourne was included by Johns (1964) in his revision of New Zealand *Pseudoprionopeltis*. He erected the subgenus *Australopeltis* for *P. martini* and illustrated the anterior segments and gonopod of a specimen from Cockatoo Creek in the Museum Victoria collection. One of the characters used by Johns to diagnose the new subgenus was the posterior corner seta, which he described as “a long seta inserted just anterior and dorsal of the [posterior paranotal] tooth” (Johns, 1964: 47).

In his reclassification of the Diplopoda, Hoffman (1980) raised *Australopeltis* to a genus. Although Chamberlin (1920) had provided a verbal description of the *L. modestus* gonopod, Hoffman (1980: 150) regarded the gonopod structure of *Lissodesmus* as “still unknown”. Nevertheless, he placed both *Australopeltis* and *Lissodesmus* in Dalodesmidae Cook, 1896. In doing so, Hoffman formalised the observation by Brolemann (1916) that the circular gonopod aperture in *P. martini* indicated an affinity between that species and Semnosomidae Brolemann, 1916, which Hoffman (1980) considered a synonym of Dalodesmidae.

Jeekel (1983) made *Australopeltis* a synonym of *Lissodesmus* after examining fresh material of Victorian *L. martini* and Tasmanian *L. modestus*. Both species had been collected by Jeekel during a 1980 field trip to Australia. Jeekel did not redefine *Lissodesmus* in the 1983 paper, instead referring the reader to "a previous paper", then in press, which actually appeared the following year (see below). However, Jeekel (1983) gave a detailed description and clear illustrations of a male of *L. martini* from Ferntree Gully National Park.

In 1984, Jeekel redescribed *L. modestus* from topotypical material and added four new Tasmanian species to the genus: *L. adrianae*, *L. alisonae*, *L. margaretae* and *L. perporosus*. In his key to the genera of Tasmanian Polydesmida, he noted that *Lissodesmus* could be separated from *Tasmanodesmus* by the presence in the former of "a long hair mesad of caudal edge of paranota" (Jeekel, 1984: 89), i.e. the posterior corner seta. *L. margaretae* Jeekel, 1984 was recently removed from *Lissodesmus* and placed with three new Tasmanian species in the new genus *Dasystigma* (Mesibov, 2003b).

As delimited here, *Lissodesmus* is what remains of the group of south-eastern Australian dalodesmids with a head + 20 segments and a long posterior corner seta after exclusion of *Dasystigma* (spiracles with hair-like structures, wide separation between solenomere and tibiotarsus origins, complex femoral process) and *Tasmanopeltis* gen. nov. (spiracles with hair-like structures, relatively long unbranched portion of telopodite, mesal "shoulder" process on prefemoral process). *Lissodesmus* is thus a product of "taxonomic erosion" of a group of similar taxa and is not defined by a set of unique character states. However, it is readily distinguished from the other regional H+20 dalodesmids *Atalopharetra* Mesibov, 2005, *Bromodesmus* Mesibov, 2004, *Gasterogramma*, *Gephyrodesmus*, *Tasmanodesmus* and *Victoriombrus* Mesibov, 2004 by its possession of a long seta at the posterior corner of each paranotum and by the gonopod structure shown schematically in Fig. 2.

To avoid repetition in the species descriptions below, I have omitted mention of the nearly constant non-sexual features which can be seen in the detailed accounts given by Jeekel (1983; 1984) of *L. adrianae*, *L. alisonae*, *L. martini*, *L. modestus* and *L. perporosus*. Note that the male antennae are separated by about twice a socket diameter unless otherwise specified.

Distribution. Throughout Tasmania, and in parts of Victoria with annual rainfall over c. 800 mm.

Lissodesmus adrianae Jeekel, 1984

Figures 7B, 11, 12, 69adr, 70adr, 71adr, 72 (map)

Lissodesmus adrianae Jeekel, 1984: 94.

Material examined. Holotype (not seen). Male, Australia, Tasmania. Ben Lomond National Park, 35 km ENE of Evandale, along the road to the top of Ben Lomond, near the park ranger office (approx. EQ530040, 41°30'49"S 147°38'06"E), 23.xi.1980, C.A.W. Jeekel & A. Jeekel-Rijvers. The type is said to be deposited in TM (Jeekel, 1984: 86), but has not yet been received there.

Paratypes. 9 males, 19 females, 10 stadium 7 males, 9 stadium 7 females, 2 stadium 6 females, details as for holotype; female, 10 km NE of Blessington, 23.xi.1980, C.A.W. Jeekel & A. Jeekel-Rijvers.

These specimens are listed as paratypes by Jeekel (1984: 94) but their present locations are unknown and they have not been examined.

Other material. 456 males, 449 females and 357 juveniles from 174 localities (see "*Lissodesmus* supplement" for details).

Description. Male c. 18 mm long, $H = 1.7$ mm. In alcohol, well-coloured specimens under low magnification with light brown body colour dorsally, a transverse band of darker brown near posterior metatergal margins and a small darker brown patch medially, paranota near-white. Antenna moderately long (Fig. 69adr). Paranota fairly wide, $R = 1.5$ (Fig. 70adr); posterior corners not turned up. Legs robust, tarsus slightly shorter than femur (Fig. 71adr). Epiproct with prominent paired, bluntly rounded projections (Fig. 7B). **Telopodite (Figs 11, 12) sparsely setose almost to apex**, reaching almost to leg 5 when retracted. Solenomere arising at just under half the telopodite height, directed at c. 45° to telopodite axis basally but smoothly curving distally, terminating at one-third to half the prefemoral process length without subapical projection. Tibiotarsus arising slightly distal to solenomere origin, rod-like, bluntly tipped, one-third as long as solenomere and much narrower, directed at c. 45° to telopodite axis. Femoral process arising at level of solenomere origin, straight, blade-like, bluntly pointed, pressed close to prefemoral process, paralleling and reaching halfway to tip of latter, just past apex of solenomere, with a short, bluntly pointed posterior branch at one-third its length. **Prefemoral process about two-thirds the width of telopodite base at origin, straight, mesal edge with a short series of small teeth midway to apex, the latter finely-toothed, anteriorly concave.** No uncus.

Distribution and habitat. In wet eucalypt forest, cool temperate rainforest, subalpine woodland and wetter microhabitats in dry eucalypt forest over c. 3500 km² in north-east Tasmania (Fig. 72), from 60 m to at least 1050 m. The western and eastern range limits of *L. adrianae* correspond to the biogeographical divides known as the East Tamar Break and Goulds Country Break, respectively (Mesibov, 1994, 1997). The most southerly known occurrence is near Castle Cary, north of Avoca. *L. adrianae* is abundant over most of its range and is by far the commonest dalodesmid in the wetter, forested parts of north-east Tasmania.

Remarks. *L. adrianae* varies little in size, coloration and gonopod structure.

Lissodesmus alisonae Jeekel, 1984

Figures 13, 14, 69ali, 70ali, 71ali, 73 (map)

Lissodesmus alisonae Jeekel, 1984: 96.

Material examined. Holotype (not seen). Male, Australia, Tasmania. 8 km NW of Frankford, 15 km SW of Beaconsfield, 24.xi.1980, C.A.W. Jeekel & A. Jeekel-Rijvers. The type is said to be deposited in TM (Jeekel, 1984: 86), but has not yet been received there.

Paratypes. 12 males, 21 females, 1 stadium 7 male, 1 stadium 6 female, details as for holotype. These specimens are listed as paratypes by Jeekel (1984: 96) but their present locations are unknown and they have not been examined.

Other material. 286 males, 308 females and 129 juveniles from 181 localities (see "*Lissodesmus* supplement" for details).

Description. Male c. 18 mm long, $H = 1.7$ mm. In alcohol, well-coloured specimens under low magnification with pale brown body colour, pale red posterior metatergal margins. Antenna moderately long (Fig. 69ali). Paranota reduced, $R = 1.4$ (Fig. 70ali); posterior corners slightly turned up. Legs robust, tarsus about as long as femur (Fig. 71ali). Telopodite (Figs 13, 14) broad at base with abrupt narrowing at start of prefemoral process, reaching almost to leg 5 when retracted. Solenomere arising at about half the telopodite height, directed distally at a small angle to the telopodite axis, terminating with toothed subapical collar at one-third to half the prefemoral process height. Tibiotarsus pointed and mesolaterally flattened, parallel to and almost as wide as solenomere but somewhat shorter and bending slightly laterally. **Femoral process arising just proximal to solenomere origin, not pressed close to prefemoral process, forked at about one-quarter its length, branches more or less equal, blade-like, pointed; anterior branch directed distally and slightly concave posteriorly, terminating just distal to solenomere tip at half to two-thirds the length of prefemoral process, posterior branch gradually curving anteriorly, its tip sometimes lying between anterior branch and prefemoral process. Prefemoral process about half the width of telopodite base, slightly tapered, the tip curved posteriorly with small, blunt, apical and subapical teeth.** Uncus prominent, arising centrally on prefemoral process at just under half the process length (at level of solenomere tip).

Distribution and habitat. Common in dry eucalypt forest, wet eucalypt forest and subalpine woodland over c. 6000 km² in north central Tasmania (Fig. 73), from sea level to at least 1000 m. The principal eastern range limit for *L. alisonae* is the biogeographical divide known as the East Tamar Break (Mesibov, 1994, 1997), although the species extends eastward along the north coast into the lower Brid River catchment, and a possibly isolated population has been sampled at Cuckoo, near Scottsdale. *L. alisonae* reaches the Don River in the west and Projection Bluff on the north-east corner of the Central Plateau. East of the Plateau *L. alisonae* is parapatric with *L. hamatus* (Mesibov, 1997) along a more or less SW-NE line across the Northern Midlands. *L. alisonae* has been found to be abundant in a second-rotation *Pinus radiata* plantation at Stoodley (Mesibov, 2005) and sometimes occurs in part-native gardens in the Launceston area. Throughout its range, populations are largest in the richly organic soil under dense stands of the understorey tree *Pomaderris apetala*.

Remarks. *L. alisonae* varies somewhat in size and coloration, with the smallest and palest forms found in dry forest on relatively infertile soils. In the north-eastern portion of the *L. alisonae* range, the femoral process on the gonopod is longer and the posterior branch less curved (Fig. 14).

Lissodesmus anas sp. nov.

Figures 4C, 5C, 15, 16, 69ana, 70ana, 71ana, 74 (map)

Lissodesmus sp. W1.—Mesibov, 1993: 31.

Material examined. Holotype. Male, Australia, Tasmania. Duck Creek, CP408763 (41°44'56"S 145°05'06"E), 160 m, 6.iii.1999, R. Mesibov, QVM 23:45823 (ex QVM 23:40749).

Paratypes. 2 males, north of Pieman Head, CP261860 (41°39'31"S 144°54'41"E), 10 m, 1.vi.1993, R. Mesibov, QVM 23:17656; 2 males, details as for holotype, AM KS91166 (ex QVM 23:40749); 2 males, details as for holotype, QVM 23:40749, dissected; 5 females, details as for holotype, QVM 23:40748.

Other material. 5 males, 9 females and 15 juveniles from Balfour, Heemskirk Road, Mt Frankland, Newdegate Creek, Pieman Head, Piney Creek, Roger River West, Savage River and Wild Wave River (see "*Lissodesmus* supplement" for details).

Description. Male c. 16 mm long, $H = 1.5$ mm. In alcohol, well-coloured specimens under low magnification with pale brown body colour, slightly darker brown near posterior metatergal margins. Antenna long, slender (Fig. 69ana). Paranota reduced with markedly oblique anterior shoulders, $R = 1.3$ (Fig. 70ana); posterior corners strongly turned up (Fig. 4C), no marginal setae. Legs fairly slender, tarsus about as long as femur, tibia with slight ventral distal swelling (Fig. 71ana). Spiracles apparently typical for genus but with a "foxtail" of hair-like structures arising just anterior and ventral to anterior spiracle, curving dorsally and posteriorly to obscure anterior spiracle and terminating near posterior spiracle; a small clump of hair-like structures arising just posterior and ventral to posterior spiracle (Fig. 5C). Telopodite (Figs 15, 16) more or less uniform in width, slightly curved posteriorly, reaching leg 5 when retracted, with unusually long, sparse setae. Solenomere arising at about half the telopodite height, directed distally before curving slightly posteriorly and laterally at about half its length, terminating with small subapical projection at about half the prefemoral process height. Tibiotarsus more or less cylindrical, about half the solenomere diameter and directed at almost a right angle to telopodite axis, the tip turned distally and pointed with a small, blunt, subapical projection on the anteromesal surface. Femoral process arising proximal to level of solenomere origin, directed distally, closely pressed to prefemoral process, blade-like with a blunt, wide posterior projection at about half the process length, terminating at about half the solenomere length. **Prefemoral process about two-thirds the width of telopodite base at origin, narrowing and bending sharply laterally at about half its length before expanding to very wide, flattened tip curving postero-mesally and aligned parallel to the telopodite axis, terminating in a comb with 20–30 long, posteriorly directed teeth.** Uncus prominent, arising at about half the length of prefemoral process (just proximal to solenomere tip), with a few small, blunt teeth subapically on proximal edge.

Distribution and habitat. Known from c. 1300 km² in north-west Tasmania, from Roger River West south to Piney Creek (north of Zeehan) (Fig. 74), and from sea level to 450 m. *L. anas* is an uncommon species and is likely to have been overlooked outside its known range. It has mainly been found in wet eucalypt forest and cool temperate rainforest, but two of the paratypes are from partly wooded heathland near the coast at Pieman Head. One specimen was taken from a cave near Savage River.

Etymology. Latin *anas* ("duck"), noun in apposition, referring to the type locality, Duck Creek.

Lissodesmus bashfordi sp. nov.

Figures 17, 18, 69bas, 70bas, 71bas, 72 (map)

Lissodesmus sp. SE1.—Mesibov, 1996: 18.

Material examined. Holotype. Male, Australia, Tasmania. Huon River (Manuka Road), DN764287 (43°05'38"S 146°42'36"E), 140 m, 15.v.1997, R. Mesibov, QVM 23:45945 (ex 23:40746).

Paratypes. Male, Dromedary Creek, EN098692 (42°43'46"S 147°07'11"E), 420 m, 19.iii.1992, R. Mesibov, QVM 23:16178; female, same details, QVM 23:16179; male, Bracken Ridge, DN897308 (43°04'31"S 146°52'25"E), 360 m, 17.i.1995, R. Bashford, QVM 23:40745; male, Huon River (Manuka Road), DN764287 (43°05'38"S 146°42'36"E), 140 m, 15.v.1997, R. Mesibov, QVM 23:40746; 7 males, Huon River (Edwards Road), DN792288 (43°05'35"S 146°44'40"E), 100 m, 9.i.2001, R. Mesibov, QVM 23:45946, 2 dissected, in 95% ethanol; male, Huon River (Manuka Road), DN765285 (43°05'45"S 146°42'40"E), 110 m, 3.ii.2001, R. Mesibov, QVM 23:45947, in 95% ethanol; male, Judds Creek, DN976476 (42°55'24"S 146°58'15"E), 390 m, 29.xi.2003, R. Mesibov & K. Bonham, AM KS91167; female, same details, QVM 23:25601; male, same details but DN970463 (42°56'10"S 146°57'49"E), 220 m, QVM 23:25603; male, Peak Rivulet, DN914020 (43°19'59"S 146°53'44"E), 140 m, 12.ix.2005, W. & L. Clarkson, QVM 23:46135.

Description. Male c. 15 mm long, $H = 1.4$ mm. In alcohol, well-coloured specimens under low magnification with very pale brown body colour and red-brown speckling transversely on metatergites, concentrated near posterior margins. Antenna relatively short (Fig. 69bas). Paranota fairly wide, $R = 1.5$ (Fig. 70bas); posterior corners not turned up. Legs moderately robust, tarsus about as long as femur, tibia with slight ventral distal swelling (Fig. 71bas). Telopodite (Figs 17, 18) reaching leg 5 when retracted. Solenomere arising at one-third the telopodite height, directed posterodistally at about 45° to telopodite axis, curving smoothly laterally and distally, the tip bending abruptly mesally and armed subapically with a small, bluntly pointed projection, terminating at about one-third the prefemoral process height. Tibiotarsus more or less cylindrical, narrower than solenomere, more or less parallel to solenomere but about half its length, curving slightly laterally. **Femoral process arising far distal to solenomere origin at half to two-thirds the telopodite length, slightly flattened near base and curving outwards, distally expanding to a large, leaf-shaped structure bent towards prefemoral process at nearly a right angle and reaching as far distally as that process.** Prefemoral process somewhat more than two-thirds the width of telopodite base, bending sharply posteriorly about midway and curving slightly mesally, terminating in large, flattened, hand-shaped tip with long lateral "thumb" and several short, marginal teeth as "fingers". Uncus small, finger-like, arising just distal to solenomere tip close to mesal edge of prefemoral process.

Distribution and habitat. An uncommon species known only from wet eucalypt forest over c. 500 km² in south-east Tasmania (Fig. 72), from 100 to 420 m.

Etymology. Named for Richard Bashford, who has collected this and many other invertebrate species in his long and productive career in forest entomology in Tasmania.

Lissodesmus blackwoodensis sp. nov.

Figures 19, 20, 69bla, 70bla, 71bla, 79 (map)

Material examined. Holotype. Male, Australia, Victoria. 3 km NW of Blackwood, 37°27'25"S 144°16'09"E, 560 m, 9.ix.2004, R. Mesibov & T. Moule, NMV K-8933.

Paratypes. 3 males, details as for holotype, AM KS91168; 10 males, details as for holotype, NMV K-8923 to K-8932; 13 females, details as for holotype, NMV K-8934 to K-8946; 13 males, 1 km NE of Blakeville, 37°29'45"S 144°13'07"E, 680 m, 10.ix.2004, R. Mesibov & T. Moule, NMV K-8947 to K-8959; 8 females, same details, NMV K-8960 to K-8967.

Description. Male c. 16 mm long, $H = 1.4$ mm. In alcohol, well-coloured specimens under low magnification with very pale brown body colour, red speckling dorsally on both prozonites and on metatergites, a well-defined transverse band of red speckling near posterior metatergal margins. Antenna moderately long (Fig. 69bla). Paranota reduced but prominent, $R = 1.4$ (Fig. 70bla); posterior corners not turned up, two inconspicuous posterior marginal teeth on each side. Legs robust, tarsus about as long as femur (Fig. 71bla). Telopodite (Figs 19, 20) with sparse, long, setae extending posterolaterally to just distal of tibiotarsus origin, reaching leg 4 when retracted. Solenomere arising at one-third the telopodite height, directed posterodistally at about 45° to telopodite axis, gradually curving distally, terminating with very small subapical projection at one-quarter to one-third the prefemoral process height. Tibiotarsus more or less parallel to solenomere but shorter, about as wide as solenomere at base and widening distally, forking near tip and terminating in two blunt points. Femoral process arising proximal to solenomere origin, mesolaterally flattened and pressed close at base to prefemoral process, directed distally and widening before terminating in bluntly pointed apex just distal to solenomere tip, anterior to a slightly projecting "shoulder". **Prefemoral process very long, about half as wide as telopodite base, bending laterally just distal to solenomere tip, then bending mesally and curving anterodistally before flexing at nearly 180° to point basally, the lateral edge a comb of c. 40 long, mainly posteriorly directed teeth for nearly its entire length, a few small teeth on mesal edge close to apex.** Uncus small, arising near base of prefemoral process on a ridge formed by the mesal edge of the process.

Distribution and habitat. Known from wet eucalypt forest at two localities 6 km apart in the southern portion of Wombat State Forest (Fig. 78).

Etymology. Named for Blackwood, the town closest to the type locality, 65 km north-west of Melbourne.

Lissodesmus catrionae sp. nov.

Figures 21, 22, 69cat, 70cat, 71cat, 78 (map)

Material examined. Holotype. Male, Australia, Victoria. Mt Cole, 37°16'44"S 143°14'23"E, 900 m, 8.ix.2004, R. Mesibov & T. Moule, NMV K-8968.

Paratypes. 3 males, details as for holotype, NMV K-8969 to K-8971, 2 dissected; 7 females, details as for holotype, NMV K-8972 to K-8978; 2 males, Mt Cole, 37°17'09"S 143°14'11"E, 850 m,

8.ix.2004, R. Mesibov & T. Moule, AM KS91169; 3 males, same details, NMV K-8979 to K-8981; female, same details, NMV K-8982.

Description. Male c. 16 mm long, $H = 1.3$ mm. In alcohol, well-coloured specimens under low magnification with very pale brown body colour, sparse red speckling on metatergites, paranota near-white. Antennae moderately long (Fig. 69cat), about $1.75\times$ a socket diameter apart. Paranota fairly wide, $R = 1.5$, anterior shoulders projecting forward (Fig. 70cat); posterior corners not turned up. Legs with high, rounded prefemur (Fig. 71cat), tarsus somewhat longer than femur. Telopodite (Figs 21, 22) with abrupt narrowing at prefemoral process origin, with sparse, long setae extending posterolaterally to just distal of tibiotarsus origin, reaching leg 4 when retracted. Solenomere arising at one-third the telopodite height, directed posterodistally at about 45° to telopodite axis and gradually curving distally, terminating with a small subapical projection at one-third to half the prefemoral process height. Tibiotarsus more or less parallel to solenomere, slightly flattened and wider than solenomere and about as long, bending slightly posteriorly at about half its length, flattening and widening apically with a large, rounded notch opening anteromesally and a small, bluntly pointed projection on anterior (distal) surface at about two-thirds the process length. Femoral process a very narrow, tapering rod arising at about half the telopodite length, directed distally and terminating just distal to solenomere tip. **Prefemoral process arising from lateral half of telopodite base, a little less than half the width of the base, narrow, very long, bending slightly posterodistally at about half its length and flexing 180° at three-quarters its length to terminate in a bluntly pointed apex not far distal to solenomere tip, the posterolateral edge in the distal half of the process a comb of c. 25–30 long, mainly proximally directed teeth.** Uncus large, arising at about one-quarter the length of prefemoral process (just proximal to solenomere tip).

Distribution and habitat. Known from wet eucalypt forest on Mt Cole, 50 km north-west of Ballarat (Fig. 78).

Etymology. Named for my wife, Catriona (Trina) Moule, in gratitude for her help in the field in Tasmania and Victoria.

Lissodesmus clivulus sp. nov.

Figures 23, 24, 69cli, 70cli, 71cli, 73 (map)

Material examined. Holotype. Male, Australia, Tasmania. The Clump, CQ213361 ($41^\circ12'23''S$ $144^\circ52'06''E$), 190 m, 6.ii.1992, R. Mesibov, QVM 23:45821 (ex QVM 23:17667).

Paratypes. 2 males, details as for holotype, AM KS91170 (ex QVM 23:17667); 11 males, details as for holotype, QVM 23:17667, 3 dissected; 16 females, details as for holotype, QVM 23:17675; male, south of Italian River, CQ180045 ($41^\circ29'25''S$ $144^\circ49'11''E$), 10 m, 30.iv.1993, R. Mesibov, QVM 23:17664.

Other material. 12 males, 26 females and 1 juvenile from Balfour, Brooks Creek, Dawson River, Little Eel Creek, Mt Frankland, Possum Creek, Sardine Creek, Sawards Creek, Sundown Creek, Sundown Point, Temma and The Clump (see "*Lissodesmus* supplement" for details).

Description. Male c. 17 mm long, $H = 1.6$ mm. In alcohol, well-coloured specimens under low magnification with light

brown body colour (unusually, extending to legs and antennae), slightly darker brown transversely on metatergites near posterior margins and distally on antennae. Antenna long, slender (Fig. 69cli). Paranota reduced but prominent, $R = 1.4$ (Fig. 70cli); posterior corners not turned up. Legs long, slender, tarsus about as long as femur (Fig. 71cli). Telopodite (Figs 23, 24) almost reaching leg 5 when retracted. Solenomere arising at half the telopodite height, directed posteriorly at a large angle (c. 60°) to telopodite axis, curving slightly laterally, terminating with toothed subapical collar at about one-quarter the prefemoral process height. Tibiotarsus about as wide as solenomere, slightly flattened and tapered near tip, directed posteriorly at almost a right angle to telopodite, curving slightly distally near tip. Femoral process arising at level of solenomere origin, a straight, distally directed blade with a pointed tip, terminating well distal to solenomere tip; at one-quarter to one-third its length with a short, narrow, bluntly tipped branch directed posteriorly and curving distally near its tip. Prefemoral process about half the width of the telopodite base at its origin, expanded past this point, narrowing near apex and bending posteriorly, a few short, large, rounded, proximally directed teeth subapically, the apex flattened and slightly crenulate. Two inconspicuous unci at about half the length of the prefemoral process, not obvious in some specimens.

Distribution and habitat. Known from c. 300 km² on the west coast of Tasmania (Fig. 73), from just north of the Arthur River to just south of the Italian River, inland to Mt Frankland, and from sea level to 400 m. Despite its small range, *L. clivulus* is sometimes locally abundant. It occurs in wet forest, coastal woodland, tea-tree forest and tea-tree scrub, and (unusually for *Lissodesmus* species) has also been found in low heath (on Mt Frankland, near Balfour).

Etymology. Latin *clivulus* ("small hill"), noun in apposition. Named for the type locality, The Clump, a low hill covered with a clump of tall eucalypt trees. Because the surrounding country is flat and heathy, The Clump has long been a landmark on the northern part of the Tasmanian west coast.

Remarks. *L. clivulus* is similar to *L. latus* in gonopod structure but the prefemoral process is shorter, the prefemoral process tip less expanded and the tibiotarsus bent posteriorly at nearly a right angle to the telopodite. The two species co-occur along the coast between the Arthur and Pieman Rivers, and can be distinguished in the field by coloration and by the smoother paranotal margin in *L. clivulus*.

Lissodesmus cognatus sp. nov.

Figures 25, 26, 27, 69cog, 70cog, 71cog, 76 (map)

Lissodesmus sp. NE3.—Mesibov, 1996: 17.—Mesibov, 1997: 567.—Mesibov, 2003a: 209.

Material examined. Holotype. Male, Australia, Tasmania. Weavers Creek, EQ330091 ($41^\circ28'07''S$ $147^\circ23'42''E$), 380 m, 31.vii.1994, R. Mesibov & T. Moule, QVM 23:15287.

Paratypes. 2 males, North Esk River, EQ336079 ($41^\circ28'46''S$ $147^\circ24'08''E$), 490 m, 23.ii.1992, R. Mesibov, QVM 23:15284; 2 males, "Elkington" property, EP312979 ($41^\circ34'11''S$ $147^\circ22'27''E$), 350 m, 18.iii.1992, R. Mesibov, AM KS91171 (ex QVM 23:15283); 4

males, same details, QVM 23:15283, 2 dissected; 2 females, Weavers Creek, EQ307122 (41°26'27"S 147°22'02"E), 680 m, 19.vii.1994, R. Mesibov, QVM 23:15289; male, Tower Hill, EP708983 (41°33'49"S 147°50'56"E), 720 m, 31.xii.1998, R. Mesibov & K. Bonham, QVM 23:40758; 10 males, Cocks Creek, EQ767040 (41°30'42"S 147°55'08"E), 480 m, ii.2001, R. Bashford, pitfall sample, QVM 23:24738, 2 dissected.

Other material. 14 males, 2 females and 5 juveniles from "Aplico" property, Cocks Creek, Grants Creek, Long Gully Creek, Musselboro, Rabbity Creek, Tower Hill and Weavers Creek (see "*Lissodesmus* supplement" for details).

Description. Male c. 14 mm long, $H = 1.3$ mm. In alcohol, well-coloured specimens under low magnification near-white in body colour with red tinge transversely near posterior margins of metatergites and dorsa of prozonites. Antennae long, slender (Fig. 69cog), about $2.5\times$ a socket diameter apart. Paranota reduced, $R = 1.3$ (Fig. 70cog); posterior corners turned up slightly. Legs fairly slender, tarsus about as long as femur, tibia with slight ventral distal swelling (Fig. 71cog). Telopodite (Figs 25, 26, 27) reaching leg 5 when retracted. Solenomere arising at half the telopodite height, directed posterodistally at a small angle to telopodite axis, terminating with toothed subapical collar at about half the prefemoral process height. Tibiotarsus a slightly flattened, bluntly pointed rod about as wide as solenomere but shorter, more or less parallel to solenomere but gradually curving laterally. Femoral process arising proximal to solenomere origin (at about one-third the telopodite length), pressed close to prefemoral process proximally, forked near base; branches more or less equal, blade-like, pointed, the anterior branch directed distally and terminating at level of solenomere tip, the posterior branch curving anteriorly, its tip sometimes lying between anterior branch and prefemoral process. Prefemoral process about half the width of telopodite base, bending posteriorly at about two-thirds its length and tapering, the flexed distal section bearing a comb of c. 15–20 large, irregular, proximally directed teeth. Uncus prominent, arising at about half the prefemoral process length (about the level of the solenomere tip) on well-defined longitudinal ridge near lateral edge of process.

Distribution and habitat. An uncommon species known from wet eucalypt forest in two disjunct areas c. 35 km apart in north-east Tasmania (Fig. 76): south and west of Mt Barrow (c. 30 km²), and north and east of Tower Hill (c. 15 km²).

Etymology. Latin *cognatus* ("kindred"), adjective. At first glance, *L. cognatus* seems to be closely related to both *L. alisonae* and *L. hamatus*.

Remarks. Furry individuals of *L. cognatus* have been found near the North Esk River, Weavers Creek and Musselboro. Specimens from the "Elkington" property, a few kilometres to the south in the South Esk River catchment, are non-furry, as are all specimens from the Tower Hill portion of the range. I have previously speculated (Mesibov, 1997, 2003a) that *L. cognatus* is a stabilised hybrid of *L. alisonae* and *L. hamatus*, i.e. a product of reticulate evolution. The two putative parents meet with minimal overlap in the western block of the *L. cognatus* range, and *L. hamatus* occurs in the eastern block.

Lissodesmus cornutus sp. nov.

Figures 28, 29, 30, 69cor, 70cor, 71cor, 74 (map)

Lissodesmus sp. SW1.—Mesibov, 1996: 18.

Material examined. Holotype. Male, Australia, Tasmania. Scotts Peak Dam, DN425343 (43°02'29"S 146°17'38"E), 280 m, pitfall samples WY and WZ collected 12–16.xi.2001, D. Driscoll, QVM 23:45827 (ex QVM 23:24824).

Paratypes. Male, Birchs Inlet, approx. CN753875 (42°33'16"S 145°28'51"E), 18.x.1993, J. Griffith, QVM 23:12036; 2 males, details as for holotype, AM KS91172 (ex QVM 23:24824); 5 males, details as for holotype, QVM 23:24824, 2 dissected; female, W of Strathgordon, DN175655 (42°45'30"S 145°59'30"E), 410 m, 1.x.2003, R. Mesibov, QVM 23:25476.

Other material. 63 males and at least 9 females and juveniles from Acheron Cave area, Darwin, Deadmans Bay, Denison River valley, Edgar Dam, Franklin River valley, Gelignite Creek, Gordon River valley, Hibbs Lagoon, Kutikina Cave area, Mt McCutcheon, Olga River valley, Orange River valley, Scotts Peak Dam and Wedge Inlet (see "*Lissodesmus* supplement" for details).

Description. Male c. 17 mm long, $H = 1.6$ mm. In alcohol, most specimens under low magnification near-white, the only pigmentation a red tinge distally on antennae. Antennae long and slender (Fig. 69cor), about $2.25\times$ a socket diameter apart. **Paranota wide, highly modified, $R = 1.5$ (Fig. 70cor), posterior corners extended as large, upwardly curved, conical structures with ozopore opening midway to tip at anterior end of lateral groove (Fig. 28).** Legs slender, tarsus about as long as femur, tibia with slight ventral distal swelling (Fig. 71cor), sphaerotrichomes lacking on leg 6 femur and prefemur. Telopodite (Figs 29, 30) somewhat sinuous, widening just proximal to prefemoral process origin, with sparse, long setae extending posterolaterally to just distal of tibiotarsus origin, reaching leg 6 when retracted. Solenomere arising at one-third the telopodite height, directed posteriorly at nearly a right angle to telopodite axis, curving distally and laterally, terminating with a small, pointed subapical projection at about one-third the prefemoral process height. Tibiotarsus much wider and somewhat longer than solenomere, directed more or less parallel to solenomere in mesal view but strongly curved laterally, flattened, widening at the apex and terminating in two large, widely spaced, bluntly pointed teeth with 1 or 2 smaller teeth between. Femoral process arising well distal to solenomere origin at about one-quarter the prefemoral process height, blade-like, pressed close at its base to the prefemoral process, directed posterodistally and curving distally and slightly mesally to terminate at two-thirds the prefemoral process height with two small apical teeth, with a large, posterobasally directed branch arising at nearly half the process length. Prefemoral process nearly as wide as telopodite base below solenomere origin, curving mesally, then laterally, then again mesally, flexing slightly posteriorly at about two-thirds its length and tapering slightly to a broad, rounded tip, with a comb of c. 15 long, posterobasally directed teeth on mesal edge of flexed distal section. Uncus large, arising centrally at about half the prefemoral process height (well distal of solenomere tip).

Distribution and habitat. Known from wet eucalypt forest and cool temperate rainforest over c. 5000 km² in south-west

Tasmania (Fig. 74), from Darwin in the north to Deadmans Bay in the south, east to the Scotts Peak Dam Road, and from sea level to at least 600 m.

Etymology. Latin *cornutus* ("horned"), adjective, for the horned shape of the posterior projections of the paranota.

***Lissodesmus devexus* sp. nov.**

Figures 31, 32, 33, 69dev, 70dev, 71dev, 74 (map)

Lissodesmus sp. NE2.—Mesibov, 1998: 155.—Mesibov, 1999: 252.

Material examined. Holotype. Male, Australia, Tasmania. Lebrina, EQ168424 (41°10'09"S 147°12'00"E), 240 m, 5.i.1993, R. Mesibov, QVM 23:45948 (ex QVM 23:15515).

Paratypes. Male, Rattler Hill, EQ744353 (41°13'48"S 147°53'15"E), 650 m, 29.viii.1990, R. Mesibov, QVM 23:15512, dissected; 2 males, details as for holotype, AM KS91173 (ex QVM 23:15515); 2 males, details as for holotype, QVM 23:15515, 1 dissected; 8 stadium 7 males, 2 stadium 7 females, details as for holotype, QVM 23:15538; 3 females, Retreat, EQ153423 (41°10'13"S 147°10'56"E), 320 m, 2.vii.1993, T. Kingston, QVM 23:21554; 2 males, same details but EQ137463 (41°08'03"S 147°09'47"E), 300 m, QVM 23:21534, 1 dissected; 4 males, Mt Roland, DQ402119 (41°26'31"S 146°17'02"E), 310 m, 5.vi.1994, R. Mesibov, QVM 23:15506, 1 dissected; 8 males, Shepherds Rivulet, EQ217388 (41°12'06"S 147°15'31"E), 150 m, 6.vii.1994, R. Mesibov, QVM 23:15509, 1 dissected; male, Lowes Mount, EP331953 (41°35'35"S 147°23'49"E), 430 m, 5.vii.1995, R. Mesibov, QVM 23:21542, dissected.

Other material. 115 males, 71 females and 45 juveniles from 77 localities (see "*Lissodesmus* supplement" for details).

Description. Male c. 12 mm long, $H = 1.3$ mm. In alcohol, most specimens under low magnification a uniform very pale brown in body colour. Antenna slender (Fig. 69dev). Paranota slightly reduced, $R = 1.5$ (Fig. 70dev), posterior corners turned up. Legs slender, tarsus about as long as femur (Fig. 71dev), sphaerotrichomes on tibia and tarsus only of leg 6. Telopodite (Figs 31, 32, 33) widest at prefemoral process origin, almost reaching leg 5 when retracted. **Solenomere arising at slightly more than half the telopodite height, directed posterodistally at a large angle (c. 60°) to the telopodite axis, terminating without a subapical process at about two-thirds the telopodite height in a sharp distal bend.** Tibiotarsus a somewhat flattened rod slightly larger than solenomere and about as long, straight and directed posterobasally at a large angle (greater than 90°) to the telopodite axis, widening and flattening near the tip and terminating in a sharp mesal bend, the tip sometimes broadly notched, the midsection with numerous annular "wrinkles" (Fig. 31). Femoral process arising at about the level of solenomere origin, small and blade-like with a somewhat sinuous outline, directed distally, not closely pressed to prefemoral process, terminating at about three-quarters the prefemoral process height (well distal to solenomere tip). Prefemoral process about as wide at its base as the telopodite base, tapering and sharply flexed posteriorly at its midpoint, the tip variably armed with teeth on posterior (proximally facing) surface (Figs 32, 33). Uncus arising on mesal edge of prefemoral process just proximal to flexure in latter, variably large (Figs 32, 33) but typically directed posterodistally and in some forms (see left gonopod in Fig. 31) paired with prefemoral process tip as a major apical feature of telopodite.

Distribution and habitat. In wet eucalypt forest and cool temperate rainforest over c. 3000 km² in the higher-rainfall parts of northern and north-east Tasmania (Fig. 74), from Browns Creek near Port Sorell east to Weldborough, south to Lowes Mount near Deddington, and from near sea level to at least 900 m. Populations around Mt Roland and Liena are apparently disjunct (Fig. 74), being separated by about 40 km from known *L. devexus* sites in the West Tamar region. *L. devexus* is gregarious and often locally abundant.

Etymology. Latin *devexus* ("sloping down"), adjective, for the orientation of the tibiotarsus on the gonopod.

***Lissodesmus dignomontis* sp. nov.**

Figures 34, 35, 69dig, 70dig, 71dig, 78 (map)

Material examined. Holotype. Male, Australia, Victoria. "Lapoinya" property, Yarragon South, 38°14'40"S, 146°05'30"E, 360 m, 17.iv.2005, R. Mesibov, NMV K-9663.

Paratypes. Male, west of Allambee, 38°16'55"S 146°00'12"E, 430 m, 30.ix.2004, R. Mesibov & T. Moule, NMV K-9507, dissected; 2 males, details as for holotype, AM KS91428; 8 males, details as for holotype, NMV K-9664 to K-9671, 1 dissected; male, Allambee, 38°16'27"S 146°03'03"E, 450 m, 22.iv.2005, R. Mesibov, NMV K-9682; 2 males, Mt Worth, 38°16'14"S 145°58'54"E, 440 m, 22.iv.2005, R. Mesibov, NMV K-9673 and K-9674.

Description. Male c. 15 mm long, $H = 1.4$ mm. In alcohol, well-coloured specimens under low magnification very pale brown in body colour with two discrete, narrow, transverse bands of red-brown posteriorly on metatergites. Antenna slender (Fig. 69dig). Paranota fairly wide, $R = 1.5$, with about 4 posterior marginal teeth (Fig. 70dig), posterior corners not turned up. Legs robust, tarsus slightly longer than femur, tibia with prominent ventral distal swelling (Fig. 71dig). Telopodite (Figs 34, 35) reaching leg 5 when retracted. Solenomere arising at half the telopodite height, directed posterodistally at a small angle to telopodite axis, terminating with small subapical projection at just over half the prefemoral process height. **Tibiotarsus rod-like, directed posterodistally and between one-third and half as long as solenomere.** Femoral process arising distal to solenomere origin at about one-third the prefemoral process height, blade-like, curving slightly anterolaterally and tapering to a blunt point, terminating at about the level of the prefemoral process tip. **Prefemoral process about half as wide at origin as telopodite base, strongly tapering distally, curving posteriorly near tip and terminating in flattened, blunt point.** Uncus prominent, arising at about half the prefemoral process height (just basal to solenomere tip).

Distribution and habitat. Known only from wet eucalypt forest at four sites within a c. 25 km² area near Mt Worth in West Gippsland (Fig. 78). At three of the four sites *L. dignomontis* co-occurs with *L. gippslandicus*, and at Yarragon South it co-occurs with *L. johnsi*.

Etymology. Latin *dignus* ("worthy") + *montis* ("mountain"), noun in apposition. Named for Mt Worth, one of the known localities for this rare species.

Lissodesmus gippslandicus sp. nov.

Figures 36, 37, 69gip, 70gip, 71gip, 79 (map)

Material examined. Holotype. Male, Australia, Victoria. Mt Fatigue, 38°34'13"S 146°18'25"E, 570 m, 28.ix.2004, R. Mesibov & T. Moule, NMV K-8990.

Paratypes. 2 males, details as for holotype, AM KS91174; male, details as for holotype, NMV K-8991; 6 females, details as for holotype, NMV K-8992 to K-8997; 9 males, 4 females, Loop Track, E of Allambee, 38°15'52"S 146°04'27"E, 440 m, 21.xii.2004, R. Mesibov, NMV K-9483 to K-9495, 2 males dissected.

Other material. 46 males and 12 females from Allambee, Allambee South, Balook, Darlimurla, Mirboo North, Mt Worth, Narracan, Tarra-Bulga National Park, Thorpdale and Yarragon South (see "*Lissodesmus* supplement" for details).

Description. Male c. 18 mm long, $H = 1.6$ mm. In alcohol, well-coloured specimens under low magnification with pale brown body colour, red-purple speckling on metatergites and intense red-purple transverse banding along posterior margins of prozonites. Antenna with relatively large antennomere 6 (Fig. 69gip). Paranota fairly wide with strongly produced anterior "shoulders" and two inconspicuous posterior marginal teeth, $R = 1.5$ (Fig. 70gip), posterior corners not turned up. Legs robust, tarsus longer than femur, tibia with prominent ventral distal swelling (Fig. 71gip). Telopodite (Figs 36, 37) almost reaching leg 4 when retracted. Solenomere arising at about half the telopodite height, directed distally with a slight posterior curvature, terminating with prominent subapical collar at about half the prefemoral process height. Tibiotarsus origin on posteromesal surface of telopodite, not close to solenomere origin; tibiotarsus a thin, pointed rod directed posterodistally at a small angle to telopodite axis, about one-quarter the length of the solenomere. **Femoral process arising well proximal to solenomere origin, blade-like with a deeply notched tip, curved anteriorly and pressed close basally to prefemoral process, terminating at less than one-quarter the prefemoral process height (well proximal to solenomere tip).** Prefemoral process about half as wide at origin as telopodite base, tapering slightly to mid-length but distally widening and flexing posteromesally, the tip pointed posteromesally, the lateral edge of the process a comb of c. 20 long, mainly posterobasally directed teeth from about two-thirds the process length. Uncus prominent, arising near base of prefemoral process on mesal side, with a widened, deeply notched tip.

Distribution and habitat. In wet eucalypt forest in West and South Gippsland (Fig. 79), often locally abundant. The Thorpdale specimens were collected in 1899, before the densely forested Thorpdale area was cleared for farming. The pre-European range of this species may have been as much as 1000 km², but is now possibly only a third of that figure.

Etymology. Named for the Gippsland district, the southern and western parts of which are home to this species.

Lissodesmus hamatus sp. nov.

Figures 4B, 6B, 38, 39, 69ham, 70ham, 71ham, 77 (map)

Lissodesmus sp. E1.—Mesibov, 1994: 134.—Mesibov, 1996: 17.—Mesibov, 1997: 567.—Mesibov, 1999: 252.

Material examined. Holotype. Male, Australia, Tasmania. Mt Hobbs, EN476926 (42°31'02"S 147°34'46"E), 580 m, 21.iii.1992, R. Mesibov, QVM 23:45944 (ex QVM 23:16073).

Paratypes. 7 males, details as for holotype, QVM 23:16073; 2 males, details as for holotype, AM KS91175 (ex QVM 23:16073); 4 stadium 7 males, 1 stadium 6 male, 7 females, 1 stadium 7 female, details as for holotype, QVM 23:15966; 4 males, Ringarooma Tier, EQ829796 (40°49'49"S 147°58'59"E), 80 m, 19.ix.1992, R. Mesibov & T. Moule, QVM 23:16076, 2 dissected; 3 pairs *in copula*, same details, QVM 23:16157; 4 females, same details, QVM 23:15845; 9 males, Lagoon of Islands, DP947376 (42°06'48"S 146°56'09"E), 750 m, 5.iii.1995, R. Mesibov, QVM 23:21349, 1 dissected; female, same details, QVM 23:21505.

Other material. 371 males, 382 females and 238 juveniles from 234 localities (see "*Lissodesmus* supplement" for details).

Description. Male c. 16 mm long, $H = 1.7$ mm (see *Remarks*). In alcohol, well-coloured specimens under low magnification with pale brown body colour and light red speckling dorsally on both prozonites and metazonites, more intense medially near posterior margins. Antenna fairly long and slender (Fig. 69ham). Paranota reduced, $R = 1.3$ (Fig. 70ham), posterior corners slightly turned up (Fig. 4B). Limbus with toothed elements (Fig. 6B). Legs fairly slender, tarsus slightly longer than femur, tibia with slight ventral distal swelling (Fig. 71ham). Epiproct with prominent paired, bluntly rounded projections. Telopodite (Figs 38, 39) reaching leg 5 when retracted. Solenomere arising at about half the telopodite height, directed posterodistally at c. 45° to telopodite axis, terminating with toothed subapical collar at one-third to half the prefemoral process height. Tibiotarsus rod-like, pointed, about two-thirds the solenomere length and apically almost touching solenomere. Femoral process arising at level of solenomere origin, blade-like and anteroposteriorly flattened with a short, shelf-like posterior branch at one-third the process length, bluntly tipped and terminating at half the prefemoral process height, just distal to solenomere tip. **Prefemoral process about two-thirds the width of telopodite base, bending laterally at about two-thirds its height with a prominent "shoulder" process on mesal side of bend, curving posteriorly distal to bend with a variable number of long, mainly posterobasally directed teeth forming a comb on lateral edge of tip.** Uncus prominent, arising centrally at about half the prefemoral process height, with a coarsely toothed outer edge.

Distribution and habitat. Common in dry and wet eucalypt forest over c. 16 000 km² in eastern Tasmania (Fig. 77), from Ringarooma Tier in the far north-east to Dunalley in the south-east, from the eastern coast (including Maria Island) across the Eastern Tiers and the Midlands to the eastern portion of the Central Plateau, and from sea level to at least 1070 m. In places along the northern edge of its range, *L. hamatus* is parapatric with *L. adrianae* and *L. alisonae* (Mesibov, 1997).

Etymology. Latin *hamatus* ("hooked"), adjective, for the upturned corners of the posterior projections of the paranota. The name was suggested by Peter Johns (in litt.), who collected *L. hamatus* near Triabunna in 1972.

Remarks. Gonopod form varies over the range of this species. The number of subterminal teeth on the prefemoral process

ranges from 6 to 10, and the width of the flexed tip of the process can be proportionately greater than shown for specimens from the type locality. In the eastern portion of the range the short, posterior branch of the femoral process often has a bluntly forked tip. *H* ranges widely, from c. 1.2 mm in drier and more southerly areas to c. 1.8 mm in wetter and more northerly areas; larger males have markedly more swollen legs.

***Lissodesmus horridomontis* sp. nov.**

Figures 40, 41, 69hor, 70hor, 71hor, 73 (map)

Lissodesmus sp. NE5.—Mesibov, 1994: 134.

Material examined. Holotype. Male, Australia, Tasmania. Mt Horror, EQ588513 (41°05'14"S 147°42'00"E), 200 m, 24.iv.1993, R. Mesibov, QVM 23:45829 (ex QVM 23:15491);

Paratypes. Male, Friend Creek, EQ862540 (41°03'37"S 148°01'33"E), 150 m, 25.xi.1992, QVM 23:15492; 4 males, Mt Horror, EQ604547 (41°03'23"S 147°43'07"E), 220 m, 18.iii.1993, R. Mesibov, QVM 23:15490; 7 females, same details, QVM 23:15484; 7 males, Speck Creek, EQ566549 (41°03'18"S 147°40'24"E), 290 m, 18.iii.1993, QVM 23:15497; 2 males, details as for holotype, AM KS91176 (ex QVM 23:15491); 2 males, details as for holotype, QVM 23:15491.

Other material. 21 males, 17 females and 5 juveniles from Connors Road, Friend Creek, Martins Hill, Mt Horror, Oxberry Creek, Pearly Brook, Speck Creek and Tomahawk River (see "*Lissodesmus* supplement" for details).

Description. Male c. 13 mm long, *H* = 1.2 mm. In alcohol, most specimens under low magnification uniformly near-white. Antenna slender, not strongly clavate (Fig. 69hor). Paranota reduced, *R* = 1.3 (Fig. 70hor), posterior corners slightly turned up. Legs robust, tarsus shorter than femur (Fig. 71hor), sphaerotrichomes lacking on leg 6 femur and prefemur. Epiproct with prominent paired, bluntly rounded projections. Telopodite (Figs 40, 41) reaching leg 5 when retracted. Solenomere arising at one-third to half the telopodite height, directed posterodistally at somewhat less than 45° to telopodite axis, terminating without subapical projection at slightly less than half the prefemoral process height. Tibiotarsus about as large as solenomere but slightly shorter, directed more or less parallel to solenomere, flattened posterobasally and terminating in a variably dentate edge with a small, bluntly pointed subapical projection on anterolateral surface. Femoral process arising at level of solenomere origin, straight, pointed, blade-like, directed distally and terminating at level of solenomere tip. **Prefemoral process about as wide at origin as telopodite base, tapering slightly and bending laterally at about mid-height with a coarsely toothed "shoulder" on the mesal side of bend, curving posteromesally with the tip flexed laterally at almost 180°, the tip bearing a comb of c. 10–15 long, basally directed teeth.** Uncus prominent, arising just proximal to lateral bend in prefemoral process (just distal to solenomere tip), outer edge coarsely dentate.

Distribution and habitat. Known from wet eucalypt forest and cool temperate rainforest over c. 150 km² in north-east Tasmania (Fig. 73), from Williams Hill east to Old Chum Dam, and from 80 to 650 m. *L. horridomontis* is abundant in the western portion of its small range.

Etymology. Latin *horridus* ("frightful") + *montis* ("mountain"), noun in apposition. Named for the type locality, Mt Horror.

***Lissodesmus inopinatus* sp. nov.**

Figures 42, 43, 69ino, 70ino, 71ino, 72 (map)

Lissodesmus sp. E2.—Mesibov, 1996: 17.

Material examined. Holotype. Male, Australia, Tasmania. Halls Creek, EP660382 (42°06'19"S 147°47'53"E), 540 m, 22.iii.1992, R. Mesibov, QVM 23:45828 (ex QVM 23:16164).

Paratypes. 2 males, details as for holotype, AM KS91177 (ex QVM 23:16164); 7 males, details as for holotype, QVM 23:16164, 2 dissected; 5 females, 1 stadium VII female, details as for holotype, QVM 23:16168; male, Pinnacles Creek, EP528531 (41°58'19"S 147°38'14"E), 520 m, 22.iii.1992, R. Mesibov, QVM 23:16165; male, Mt Ponsonby, EN441966 (42°28'53"S 147°32'11"E), 610 m, 3.ix.2000, R. Mesibov, QVM 23:41984; male, Anglers Creek, EP697230 (42°14'30"S 147°50'41"E), 570 m, 7.x.2001, R. Mesibov & T. Moule, QVM 23:24858.

Other material. 3 males, 16 females and 8 juveniles from Anglers Creek, Mt Mismanagement, Parramores Tier, Pinnacles Creek and Rocka Rivulet (see "*Lissodesmus* supplement" for details).

Description. Male c. 17 mm long, *H* = 1.7 mm. In alcohol, well-coloured specimens under low magnification with very pale brown body colour, faintly reddish and more intense medially and posteriorly on metatergites. Antenna long and slender (Fig. 69ino). Paranota reduced, *R* = 1.3 (Fig. 70ino), posterior corners turned up. Legs fairly slender, tarsus shorter than femur, tibia with slight ventral distal swelling (Fig. 71ino). Telopodite (Figs 42, 43) widest at prefemoral process origin, reaching leg 5 when retracted. Solenomere arising at one-third the telopodite length, directed posterodistally at a small angle (c. 30°) to telopodite axis, terminating with toothed subapical collar at just under half the prefemoral process height. Tibiotarsus nearly as thick as solenomere but slightly shorter, directed posterodistally and slightly laterally at acute angle to solenomere, flattened and bluntly pointed. Femoral process arising at level of solenomere origin, forked near base, both branches blade-like, pointed; anterior branch directed distally and pressed close to prefemoral process, terminating at about one-third the prefemoral process height (proximal to solenomere tip); posterior branch smaller than anterior branch, curved anterodistally. **Prefemoral process at base about two-thirds the width of telopodite base proximal to solenomere origin, bending sharply posterolaterally at about two-thirds its height with a large, mesolaterally flattened, broadly toothed projection on mesal edge of prefemoral process at bend, the distal portion of process with c. 10–20 teeth lying at a small angle to process axis, the tip also toothed.** Uncus prominent, arising on mesal edge of prefemoral process at about half the process height (just distal to solenomere tip).

Distribution and habitat. An uncommon species in dry and wet eucalypt forest over c. 1000 km² in the Eastern Tiers of Tasmania (Fig. 72), from Pinnacles Creek (c. 15 km E of Campbell Town) south to Mt Ponsonby and east to Anglers Creek.

Etymology. Latin *inopinatus* ("unexpected"), adjective. While carrying out a Tasmania-wide millipede survey in the 1990s,

the only *Lissodesmus* species I expected to find in the *L. inopinatus* range was *L. hamatus*.

Remarks. *L. inopinatus* varies considerably in overall size across its range.

***Lissodesmus johnsi* sp. nov.**

Figures 44, 45, 69joh, 70joh, 71joh, 78 (map)

Material examined. Holotype. Male, Australia, Victoria, Uralla Nature Reserve, Trafalgar, 38°13'36"S 146°08'53"E, 140 m, 19.iv.2005, R. Mesibov, NMV K-9682.

Paratypes. Male, near Trafalgar, Gippsland, viii.1890, W. Kershaw, NMV K-9506, dissected; male, "Lapoinya" property, Yarragon South, 38°14'30"S 146°05'34"E, 370 m, 17.iv.2005, R. Mesibov, NMV K-9681; 2 males, details as for holotype, AM KS91429; 10 males, details as for holotype, NMV K-9683 to K-9692, 1 dissected; 9 females, details as for holotype, NMV K-9693 to K-9701.

Description. Male c. 14 mm long, $H = 1.2$ mm. In alcohol, well-coloured specimens under low magnification very pale brown in body colour with red-brown speckling transversely on posterior half of metatergites. Antenna short, moderately slender (Fig. 69joh). Paranota prominent but reduced, $R = 1.4$, with 4-5 posterior marginal teeth (Fig. 71joh), posterior corners not turned up. Legs short, robust, tarsus about as long as femur, tibia with prominent ventral distal swelling (Fig. 70joh). Telopodite (Figs 44, 45) posteriorly excavated at base, reaching leg 5 when retracted. Solenomere arising at just over half the telopodite height, directed posterodistally at a small angle to telopodite axis, terminating at somewhat more than half the prefemoral process height with flattened, posterolaterally flexed tip. **Tibiotarsus broad and flattened, a marginally toothed fan in posterior view, directed distally and about half as long as solenomere.** Femoral process arising well distal to solenomere origin at about half the prefemoral process height, blade-like, slightly swollen distally but tapering to a blunt point, terminating distal to prefemoral process tip. **Prefemoral process about half as wide at origin as telopodite base, curving slightly mesally, sharply tapering distally and terminating in a simple blunt point.** Uncus prominent, arising at about two-thirds the prefemoral process height (at about the level of solenomere tip).

Distribution and habitat. Known only from wet eucalypt forest in a small area near Trafalgar in West Gippsland (Fig. 78); the two contemporary sites are c. 5 km apart. At the Yarragon South locality, *L. johnsi* co-occurs with *L. dignomontis* and *L. gippslandicus*.

Etymology. Named for Peter Johns, formerly of the University of Canterbury (Christchurch, New Zealand), who recognised the distinctiveness of the 1890 specimen and illustrated its gonopod, assigning the species to *Pseudopriopeltis* (*Australopeltis*) without naming it (Johns, 1964).

***Lissodesmus latus* sp. nov.**

Figures 6A, 9, 46, 69lat, 70lat, 71lat, 75 (map)

***Lissodesmus* sp. NW1.**—Mesibov, 1993: 31.—Mesibov, 1996: 18.—Mesibov, 1998: 155.—Bonham et al., 2002: 240.

Material examined. Holotype. Male, Australia, Tasmania. Wombat Hill, W of Waratah, CQ703065 (41°28'56"S 145°26'47"E), 670 m, 24.ix.1990, R. Mesibov, QVM 23:17495.

Paratypes. 2 males, Wombat Hill, W of Waratah, CQ702064 (41°29'00"S 145°26'42"E), 680 m, 19.ix.1990, R. Mesibov, AM KS91178 (ex QVM 23:17490); 2 males, same details, QVM 23:17490, 1 dissected; 2 males, same details but 22.ix.1990, QVM 23:17491; 2 males, details as for holotype but 23.ix.1990, QVM 23:17492; 2 males, Wombat Hill, W of Waratah, CQ704066 (41°28'53"S 145°26'51"E), 690 m, 28.ix.1990, R. Mesibov, QVM 23:17496, 1 dissected; male and female *in copula*, same details, QVM 23:17497; 7 females, same details, QVM 23:17547; 2 males, same details but 29.ix.1990, QVM 23:17493; 2 males, same details but 30.ix.1990, QVM 23:17494; 9 males, Montagu Swamp, CQ265620 (40°58'28"S 144°56'16"E), 30 m, 22.vi.1991, R. Mesibov, QVM 23:17499, 1 dissected; 5 males, 2 females, Deep Creek Bay, CQ447787 (40°49'40"S 145°09'29"E), <10 m, 5.ix.2000, K. Bonham, QVM 23:41955, 2 males dissected.

Other material. 186 males, 116 females and 20 juveniles from 105 localities (see "*Lissodesmus* supplement" for details).

Description. Male c. 20 mm long, $H = 1.8$ mm. In alcohol, well-coloured specimens of typical form (see *Remarks*) under low magnification with near-white body colour and wide, transverse, purple banding, interrupted medially, on posterior margin of prozonites. Antenna long (Fig. 69lat). Paranota fairly wide, $R = 1.5$, sometimes with two prominent posterior marginal teeth (Fig. 70lat), posterior corners not turned up (Fig. 9). Limbus elements simple, tapering to point (Fig. 6A). Legs robust, tarsus longer than femur, tibia with slight ventral distal swelling (Fig. 71lat). Telopodite (Fig. 46) reaching leg 5 when retracted. Solenomere arising between one-quarter and one-third the telopodite height, directed posterodistally at c. 30° to telopodite axis, curving laterally, terminating with toothed sub-apical collar at about one-third the prefemoral process height. Tibiotarsus wider than solenomere and slightly longer, curving more sharply laterally, diverging from solenomere at a small angle, terminating in a thin, dentate edge sometimes turned anterodistally at level of solenomere tip. Femoral process arising slightly distal to solenomere origin, forked at about one-third its length, both branches blade-like, bluntly pointed; anterior branch closely pressed to prefemoral process at its base, terminating at level of solenomere tip; posterior branch typically as long as or slightly longer than anterior branch, curved anterodistally. Prefemoral process at its origin about two-thirds as wide as telopodite base, very slightly bent laterally, bending posteriorly at just over half its length, the mesal edge and expanded, mesolaterally flattened tip both crenulate or shortly toothed. Two small unci arising at just under half the prefemoral process height (just distal to solenomere tip), one central and one on mesal edge of process.

Distribution and habitat. In cool temperate rainforest, wet eucalypt forest and coastal scrub and blackwood/tea-tree forest over c. 13 000 km² in north-west Tasmania (Fig. 75), from the Hunter Group of islands to the Franklin River, from the west coast inland to the Leven River and the Cradle Mountain area, and from sea level to at least 950 m. *L. latus* has been found in caves at Gunns Plains, Loongana, Mt Cripps and the Wilson River. It co-occurs with *L. perporosus* over most of its range

and is typically less abundant than *L. perporosus* when the two are syntopic.

Etymology. Latin *latus* ("broad, wide"), for the wide and relatively flat paranota.

Remarks. Besides the inland form of *L. latus*, represented by the holotype, there is a distinctive coastal form with almost uniformly pale brown to chestnut-brown coloration and with stronger dorsal curvature of the paranota. Despite the striking difference in overall appearance of the two *L. latus* forms, the gonopods of coastal and inland forms in the far north-west are almost indistinguishable. The coastal form occurs close to the western and Bass Strait coasts and in the Hunter Group of islands. I have not yet found a site in the far north-west of Tasmania where the coastal and inland forms co-occur. Coastal *L. latus* closely resembles *L. perporosus*, but females and juveniles of the two species can be separated by inspection of the ozopores (i.e., the pore formula in *L. latus* is normal).

Inland *L. latus* vary in the height of the paranotal margins relative to the body axis, in the sharpness of notches on the lateral edge of the paranota, and in the clear presence or near-absence of a pair of rounded teeth on the posterior margin of each paranotum. On the gonopod telopodite, the anterior branch of the femoral process varies from nearly straight to arc-like (concave posteriorly), and the tip of the tibiotarsus can be straight or upturned. Furry specimens of *L. latus* have been found in the Mt Cripps area and at Lake Lea and the nearby Vale of Belvoir (Fig. 9).

***Lissodesmus macedonensis* sp. nov.**

Figures 47, 48, 69mac, 70mac, 71mac, 79 (map)

Material examined. Holotype. Male, Australia, Victoria. Mt Macedon, 37°22'42"S 144°36'35"E, 880 m, 10.ix.2004, R. Mesibov & T. Moule, NMV K-9527.

Paratypes. 2 males, Mt Macedon, 22.x.1963, A. Neboiss, NMV K-9508, K-9509; 2 males, details as for holotype, AM KS91179; 15 males, 1 female, details as for holotype, includes male and female in copula, NMV K-9511 to K-9526, 2 males dissected; 9 females, details as for holotype, NMV K-9528 to K-9536; male, 1 km NE of Blakeville, 37°29'45"S 144°13'07"E, 680 m, 10.ix.2004, R. Mesibov & T. Moule, NMV K-9510.

Description. Male c. 17 mm long, $H = 1.5$ mm. In alcohol, well-coloured specimens under low magnification with very pale brown body colour and red speckling on metatergites, more intense medially and in a transverse band close to posterior metatergal margin. Antenna short, stout (Fig. 69mac). Paranota fairly wide, $R = 1.5$, with several indistinct posterior marginal teeth (Fig. 70mac), posterior corners not turned up. Legs short, robust, tarsus about as long as femur, tibia with slight ventral distal swelling (Fig. 71mac). Telopodite (Figs 47, 48) reaching leg 5 when retracted. Solenomere arising at one-third to half the telopodite height, directed posterodistally at c. 45° to telopodite axis, terminating with small, pointed subapical projection at one-quarter to one-third the prefemoral process height. Tibiotarsus strongly flattened anteroposteriorly, about as long as solenomere but diverging from it slightly, the expanded tip curling back anterodistally. Femoral process arising distal to solenomere origin at about one-quarter the

prefemoral process height, blade-like, wide, pressed close to prefemoral process at base, deeply notched distally with rounded tips, terminating at just under half the height of prefemoral process. **Prefemoral process at its origin about half as wide as telopodite base, slightly tapered, curving posteromesally at about two-thirds its length, the lateral edge of the distal half a comb of c. 25 long, mainly basally directed teeth, the process tip turned back nearly 180°.** Uncus large, arising from mesal edge of prefemoral process at about one-third the process height (just distal to solenomere tip).

Distribution and habitat. Known from wet eucalypt forest at two localities c. 30 km apart: the upper slopes of Mt Macedon, where it is abundant, and near Blakeville in the southern portion of the Wombat State Forest (Fig. 79).

Etymology. Named for the type locality, 55 km north-west of Melbourne.

***Lissodesmus martini* (Carl, 1902)**

Figures 49, 50, 69mar, 70mar, 71mar, 79 (map)

Pseudopronopeltis martini Carl, 1902: 599.—Brolemann, 1916: 541.—Chamberlin, 1920: 133.—Verhoeff, 1932: 1982.—Attems, 1940: 453.

Pseudopronopeltis (Australopeltis) martini Johns, 1964: 47.

Lissodesmus martini Jeekel, 1983: 150.—Jeekel, 1984: 86.

Material examined. Holotype (not seen). Male, Australia, Victoria. Melbourne, date of collection unknown, collected by "Consul Martin", deposited in the Muséum d'Histoire Naturelle in Geneva. According to Johns (1964: 47), who re-illustrated the gonopod of the type, the holotype body has been lost and only a slide mount of the gonopods remains.

Paratypes. None designated.

Other material. 50 males, 19 females and 8 juveniles from Acheron Gap, "The Beeches" near Marysville, Belgrave West, the Bennisson Plains area NE of Licola, Coalville, Cockatoo Creek, Emerald, Erica, Gembrook, the Latrobe River near Powelltown, Mt Observation, Narracan, Narracan East, Neerim, Noojee, Sherbrooke Forest, Slippery Hill N of Dargo, Starvation Creek NE of Warburton, Toolangi, Yallourn North and Yinnar (see "*Lissodesmus* supplement" for details). I have not examined the male from Ferntree Gully National Park described by Jeekel (1983).

Description. Male c. 18 mm long, $H = 1.6$ mm. In alcohol, well-coloured specimens under low magnification with pale brown body colour, red speckling anteriorly on metatergites and a red transverse band posteriorly on prozonites, paranota near-white. Antenna moderately long (Fig. 69mar). Paranota fairly wide, $R = 1.5$, with about 3 posterior marginal teeth (Fig. 70mar), posterior corners not turned up. Legs robust, tarsus longer than femur, tibia with prominent ventral distal swelling (Fig. 71mar). Telopodite (Figs 49, 50) almost reaching leg 5 when retracted. Solenomere arising at about half the telopodite height, directed posterodistally at a small angle (c. 30°) to telopodite axis, terminating with toothed subapical collar at just under half the prefemoral process height. Tibiotarsus origin on posteromesal surface of telopodite, not close to solenomere origin; tibiotarsus a thin, pointed rod almost parallel to solenomere but curving anterodistally, about half the length of

the solenomere. **Femoral process arising at level of solenomere origin, a massive, wide, bluntly pointed blade directed distally, close to prefemoral process, terminating at just over half the prefemoral process height (distal to solenomere tip). Prefemoral process at its base about half as wide as telopodite base, curving slightly mesally at half its height, bent posteromesally at about three-quarters its length, the tip expanded and dentate on its posterior-facing edge.** Uncus prominent, arising near mesal edge of prefemoral process at just under half the process height (at same level as solenomere tip), with inconspicuously dentate outer edge.

Distribution and habitat. In dry and wet eucalypt forest and cool temperate rainforest in the Central Highlands and parts of Gippsland. To judge from earlier records, *L. martini* once ranged east and north-east from Melbourne for ca. 200 km, and it is still Victoria's most widely distributed *Lissodesmus* species (Fig. 79). It is abundant in the Yarra Ranges and occurs up to at least 1120 m elevation.

Remarks. Carl (1902) characterised *Pseudoprionopeltis* as having 21 segments behind the head, rather than the expected 19 or 20. The correct number, 20, was first given by Johns (1964) for *L. martini*. Engghoff et al. (1993: 148) suggested that Carl's "21" may have been a typographical error.

Chamberlin (1920) gave *Polydesmus* (*Oxyurus*) *serratus* Hutton, 1877 as a synonym of *P. martini*, and listed the type locality of *serratus*, Dunedin in New Zealand, as the only *P. martini* locality. This was clearly an error, as Chamberlin (1920: 133) also claimed that both the identity and generic placement of *P. serratus* were impossible to determine.

This is the fourth time *L. martini* has been described and illustrated, and I am contributing little new other than a scanning electron micrograph of the gonopods. *L. martini* varies only slightly over most of its range, but specimens from the east of that range are smaller and paler than those from the west.

Lissodesmus milledgei sp. nov.

Figures 51, 69mil, 70mil, 71mil, 78 (map)

Material examined. Holotype. Male, Australia, Victoria. Myrtle Gully Reserve, 3.4 km WSW of Mt Donna Buang, 37°43'S 145°38'30"E, pitfall emptied 20.i.1995, G. Milledge, ex sample NOH-1840, NMV K-9604.

Paratypes. Male, details as for holotype but 7.iv.1995, ex sample NOH-1841, NMV K-9605; male, Acheron Gap, 6 km NE of Mt Donna Buang, 37°40'43"S 145°44'20"E, pitfall emptied 28.xii.1995, G. Milledge, sample NOH-1851, NMV K-9606, dissected.

Other material. Male, The Beeches, 37°28'S, 145°49'E, 25.iii.1991, M.S. Harvey & M.E. Blofeld, *Nothofagus* litter, WAM T66223.

Description. Male c. 14 mm long, $H = 1.3$ mm. In alcohol, under low magnification with uniformly very pale brown body colour. Antenna short (Fig. 69mil). Paranota reduced, $R = 1.4$, anterior shoulders squared rather than rounded (Fig. 70mil), posterior corners slightly turned up. Legs moderately robust, tarsus shorter than femur, tibia with slight ventral distal swelling, sphaerotrachomes on tibia and tarsus only of leg 6 (Fig. 71mil). Telopodite (Fig. 51) reaching leg 5 when retracted. Solenomere arising at half the telopodite height,

directed posterobasally at large angle to telopodite axis but bending at about one-third the process length distally and slightly mesally, terminating with small subapical projection at between one-third and half the prefemoral process height. Tibiotarsus origin on posteromesal surface of telopodite, not close to solenomere origin; tibiotarsus a posterobasally flattened triangular plate with a bluntly pointed tip, directed at c. 45° to telopodite axis, about one-third the solenomere length. Femoral process arising at level of solenomere origin, directed distally and pressed close to prefemoral process, blade-like with a slight anterior shoulder distally, tip rounded, terminating at one-third to half the prefemoral process height (at level of solenomere tip). **Prefemoral process somewhat narrower than telopodite base, tapering, the distal one-third curving posterobasally and slightly mesally and bearing a comb of c. 15–20 long, mainly basally directed teeth; a cluster of three small tooth-like projections on mesal edge of prefemoral process at about two-thirds the process height.** Uncus prominent, arising at level of solenomere and femoral process tips towards lateral edge of prefemoral process.

Distribution and habitat. Known from three localities in cool temperate rainforest in the Yarra Ranges east of Melbourne (Fig. 78).

Etymology. Named for Graham Milledge, who collected this and many other interesting invertebrate species in the mid-1990s from *Nothofagus* forest in Victoria.

Lissodesmus modestus Chamberlin, 1920

Figures 4A, 5A, 7A, 8A, 52, 53, 69mod, 70mod, 71mod, 73 (map)

Lissodesmus modestus Chamberlin, 1920: 135.—Attems, 1940: 490.—Jeekel, 1970: 336.—Jeekel, 1984: 91.

Material examined. Holotype. Male, Australia, Tasmania. Russell Falls, G.H. Hardy, MCZ 4644. The type is in three pieces but is otherwise in excellent condition. An accompanying label reads "Jan 1915 Russell Falls".

Paratypes. Female, details as for holotype, MCZ 4645.

Other material. 57 males, 82 females and 32 juveniles from Arve Road, Bracken Ridge, Collins Cap, Coopers Creek, Dromedary Creek, Edwards Road, Espies Craig, Fortescue Bay, Gold Creek, Hastings Caves, Ida Bay cave IB-51, Judds Creek, Kallista Creek, Little Florentine River, Mt Clark, Mt Field National Park, Mt Mangana (Bruny Island), Mt Misery, Mt Wellington, Myrtle Forest Creek, Needles Picnic Area, Pelham Tier, Pendulum Palace Cave (Precipitous Bluff), Picton River, Plenty River and Tobys Hill (see "*Lissodesmus* supplement" for details).

Description. Male c. 16 mm long, $H = 1.4$ mm. In alcohol, well-coloured specimens under low magnification very light brown in body colour, with fairly uniform red speckling across metatergites and in a transverse band posteriorly on prozonites. Antenna long, fairly slender (Fig. 69mod). Paranota fairly wide, $R = 1.5$ (Fig. 70mod), posterior corners not turned up (Fig. 4A) but projecting slightly outwards in most specimens (see also Jeekel, 1984: 93, Fig. 1). Legs robust, tarsus slightly shorter than femur, tibia with prominent ventral distal swelling (Fig. 71mod). Telopodite (Figs 52, 53) reaching leg 4 when retracted. [Note: the convention adopted here of labelling as

“mesal” a telopodite view centred on the solenomere is particularly misleading for this species. As seen in Fig. 52, the solenomere origin is on the anterior surface of the telopodite in situ.] Solenomere arising at about half the telopodite height, directed basally at about 45° to telopodite axis but gradually curving distally, terminating with a small subapical projection at just under half the prefemoral process height. Tibiotarsus rod-like, pointed, directed more or less parallel to solenomere, about one-third the length of solenomere and much thinner. **Femoral process arising distal to solenomere origin, large, blade-like with expanded, leaf-shaped tip, curving posteromesally and terminating just proximal to tip of prefemoral process. Prefemoral process at origin about two-thirds as wide as telopodite base, at about half-length tapering rapidly and bending posteromesally, then bending distally, the last one-third straight, with a row of short, mainly posterodistally and mesodistally directed teeth on mesal edge.** Uncus identification uncertain; possibly represented by low, pointed ridge on prefemoral process at about the level of solenomere tip.

Distribution and habitat. In wet eucalypt forest and cool temperate rainforest over c. 4500 km² in southern and south-east Tasmania (Fig. 73), from Pelham to the south coast, from the Little Florentine River east to the Channel district, and from near sea level to at least 940 m. *L. modestus* also occurs on South Bruny Island and the Tasman Peninsula, but has not yet been recorded on either North Bruny Island or Forestier Peninsula. It occurs in caves at Ida Bay and Precipitous Bluff. *L. modestus* is hard to find in many parts of its range.

Remarks. As noted in the Introduction, there are minor errors with the antennomeres and sphaerotrichomes in the description given by Jeekel (1984). The gonopod coxae are also said (Jeekel, 1984: 93) to be “solidly connected”, which suggests “fused”; they are in fact separate and lightly joined at only one point, as in all *Lissodesmus* species. Jeekel’s description is otherwise accurate and very detailed.

Lissodesmus montanus sp. nov.

Figures 54, 55, 69mon, 70mon, 71mon, 73 (map)

Material examined. Holotype. Male, Australia, Tasmania. Lake Lea, DP083989 (41°33′22″S 145°54′01″E), 950 m, 18.xii.1993, R. Mesibov & T. Moule, QVM 23:17717.

Paratypes. Male, Algonkian Mountain, approx. DP220059 (42°23′42″S 146°03′08″E), 1020 m, 26.ii.1987, S.J. Smith, ex WHA sample ML011, QVM 23:17715, dissected; female, same details, QVM 23:17714; male, Algonkian Mountain, approx. DP229067 (42°23′16″S 146°03′48″E), 1020 m, 26.ii.1987, S.J. Smith, ex WHA sample ML005, QVM 23:17716, dissected; male, same details, AM KS91180; female, Squires Creek, DP240255 (42°13′07″S 146°04′44″E), 650 m, 16.ii.1994, R. Mesibov, QVM 23:40813; male, Mt Murchison summit, CP850703 (41°48′38″S 145°36′55″E), 1250 m, 11.iv.1998, R. van Riet & B. Dudman, QVM 23:40744.

Description. Male c. 23 mm long, $H = 2.4$ mm. In alcohol, well-coloured specimens under low magnification an almost uniform light red-brown in body colour (unusually, extending to legs and antennae) with small pale brown patches medially and anteriorly on metatergites, and laterally on paranota.

Antenna fairly short, fairly slender (Fig. 69mon). Paranota fairly wide, $R = 1.5$ (Fig. 70mon), posterior corners not turned up. Legs robust, tarsus longer than femur (Fig. 71mon). Telopodite (Figs 54, 55) narrowing sharply at prefemoral process origin, reaching leg 5 when retracted. Solenomere arising at one-third to half the telopodite height, directed basally at c. 45° to telopodite axis, curving gradually distally, terminating with a toothed subapical collar at about one-third the prefemoral process height. **Tibiotarsus as large as solenomere but diverging from it and curving laterally, greatly expanding apically and deeply and broadly notched, thus terminating in two large spine-like structures.** Femoral process arising just distal to solenomere origin, blade-like with a slight posterior shoulder apically, pressed close to prefemoral process, terminating at about half the prefemoral process height (distal to solenomere tip). **Prefemoral process at origin about half as wide as telopodite base, bending first mesally then distally, the tip curving posteriorly with a comb of c. 20 long, mainly posterobasally teeth on mesal edge, the comb continued proximally as a row of more irregular “saw-teeth” to about the level of solenomere tip.** Uncus small, arising centrally just proximal to solenomere tip.

Distribution and habitat. Known from four localities over a range of c. 500 km² in central western Tasmania (Fig. 73), from 650 to 1250 m. At Algonkian Mountain, Lake Lea and Squires Creek the habitat was cool temperate rainforest, while on Mt Murchison *L. montanus* was found walking by day among bare rocks (R. van Riet, pers. comm.).

Etymology. Latin *montanus* (“of mountains”), adjective.

Lissodesmus orarius sp. nov.

Figures 8B, 56, 57, 69ora, 70ora, 71ora, 76 (map)

Material examined. Holotype. Male, Australia, Tasmania. Foam Creek, CP255877 (41°38′35″S 144°54′16″E), <10 m, 1.vi.1993, R. Mesibov, QVM 23:45822 (ex QVM 23:17693).

Paratypes. 10 males, Pedder River, CQ150149 (41°23′45″S 144°47′13″E), <10 m, 23.i.1991, R. Mesibov, QVM 23:17683, 2 dissected; 2 males, details as for holotype, AM KS91181 (ex QVM 23:17693); 9 males, details as for holotype, QVM 23:1769, 2 dissected; 3; 18 females, 2 stadium VI juvenile females, details as for holotype, QVM 23:17704.

Other material. 28 males, 53 females and 20 juveniles from Chimney Creek, Foam Creek, Hunters Creek, Interview River, Lanes Tor, Monster Creek, Pedder River, Pieman Head, Rocky Creek, Rupert Point, Sandy Cape and Sea Devil Rivulet (see “*Lissodesmus* supplement” for details).

Description. Male c. 17 mm long, $H = 1.5$ mm. In alcohol, well-coloured specimens under low magnification with almost uniform light brown body colour, somewhat darker posteriorly on prozonites and lighter on paranotal edges. Antenna short, fairly stout (Fig. 69ora). Paranota reduced, $R = 1.4$ (Fig. 70ora), posterior corners not turned up. Legs moderately robust, tarsus much longer than femur, tibia with slight ventral distal swelling (Fig. 71ora), sphaerotrichomes lacking on leg 6 prefemur (Fig. 8B). Telopodite (Figs 56, 57) reaching just past leg 6 when retracted. Solenomere arising at about one-third the telopodite height, directed posterodistally at c. 45° to telopodite axis,

sharply curving distally and laterally at midpoint, terminating with small subapical projection at about one-third the prefemoral process height. Tibiotarsus about as large as solenomere and paralleling its course, the tip turned distally and bluntly pointed, terminating just proximal to solenomere tip. Femoral process arising distal to solenomere origin, blade-like and slightly expanded in middle, directed distally and pressed close to prefemoral process, bluntly pointed and terminating at about two-thirds the prefemoral process height (distal to solenomere tip). **Prefemoral process as wide as telopodite base, slightly curved laterally, the tip wide, greatly flattened and concave posteriorly, few small teeth on posterior edge of lateral rim, the mesal rim bearing (a) at the process tip a long, more or less cylindrical branch curving posterolaterally, (b) a smaller, finger-like branch directed posterodistally more proximally, and (c) a sharp triangular point at about the level of the femoral process tip.** Uncus small, arising near mesal edge of prefemoral process at level of solenomere tip.

Distribution and habitat. Known from a c. 30 km strip along the west coast of Tasmania (Fig. 76), from the Pedder River (just north of Sandy Cape) to the mouth of the Pieman River. Along this strip, *L. orarius* has been found just above sea level in dune scrubs, tea-tree forest and tea-tree scrub. Remarkably, the *L. orarius* distribution extends down to the high tide line, and at the type locality this species was found together with intertidal crabs under driftwood surrounded by sedge and grass. At most of its known localities *L. orarius* is abundant.

Etymology. Latin *orarius* ("of the coast"), adjective.

Remarks. The number and size of teeth on the lateral branch of the prefemoral process vary a little across the *L. orarius* range.

Lissodesmus otwayensis sp. nov.

Figures 58, 59, 69otw, 70otw, 71otw, 79 (map)

Material examined. Holotype. Male, Australia, Victoria, Calder Ridge, 38°42'41"S 143°34'03"E, 380 m, 13.xii.2003, R. Mesibov & T. Moule, NMV K-9614.

Paratypes. Male, 2 miles W of Apollo Bay, 8.iii.1975, M. Campbell, NMV K-9607; 1 stadium 7 male, 1 female, 2 stadium 7 females, Aire Crossing Track, 0.5 km N of Aire R crossing, 38°40'S 143°29'E, 31.i.1995, G. Milledge, direct search, sample NOH-1086, NMV K-9608 to K-9611; 2 males, Turtons Pass, 38°38'43"S 143°40'36"E, 420 m, 12.xii.2003, R. Mesibov & T. Moule, NMV K-9612, K-9613, 1 dissected; 2 males, same details, AM KS91182; 2 males, details as for holotype, NMV K-9618, K-9619, 1 dissected; 3 females, details as for holotype, NMV K-9615 to K-9617; 7 males, Cape Horn, 38°44'13"S 143°34'30"E, 280 m, 13.xii.2003, R. Mesibov & T. Moule, NMV K-9620 to K-9626, 2 dissected; 2 males, 1 female, Diamond Hill, 38°27'05"S 143°56'10"E, 360 m, 14.xii.2003, R. Mesibov & T. Moule, NMV K-9627 to K-9629, 1 male dissected; male, same details but 38°27'00"S 143°56'14"E, NMV K-9630.

Description. Male c. 17 mm long, $H = 1.6$ mm. In alcohol, well-coloured specimens under low magnification pale brown in body colour with red speckling dorsally on prozonites and metatergites, and a darker, transverse red band posteriorly on metatergites. Antennae short, clavate (Fig. 69otw), about 1.75× a socket diameter apart. Paranota reduced, $R = 1.4$ (Fig. 70otw),

posterior corners not turned up. Legs robust, tarsus longer than femur, tibia with prominent ventral distal swelling (Fig. 71otw). Telopodite (Figs 58, 59) reaching leg 5 when retracted, with posterolateral row of sparse long setae running well distal to process origins, the base posteriorly somewhat excavate just below process origins. Solenomere arising at one-third the telopodite height, directed posterodistally at c. 45° to telopodite axis, curving very slightly laterally, terminating with small subapical projection at just under one-third the prefemoral process height. Tibiotarsus rod-like, bluntly pointed, more or less parallel to solenomere but somewhat narrower and about half its length. **Femoral process arising distal to solenomere origin, blade-like, forked at about half its length, both branches wide and apically pointed; anterior branch curving anteriorly and terminating at about one-third the prefemoral process height (just distal to solenomere tip); posterior branch directed posterodistally and curving slightly mesally. Prefemoral process curving slightly laterally, narrowing and curving posteriorly and distally at just over half the process height, with a sharply pointed "shoulder" on the mesal edge marking the bend, distally bending sharply mesally and tapering to blunt point, almost the whole of the lateral edge distal to the bend a comb of c. 30–40 long, straight teeth.** Uncus arising at just under half the prefemoral process height (distal to solenomere tip) on mesal edge of process.

Distribution and habitat. In wet eucalypt forest and cool temperate rainforest in the Otway Ranges (Fig. 79).

Etymology. Named for the Otway Ranges, where this species appears to be abundant.

Lissodesmus peninsulensis sp. nov.

Figures 60, 61, 69pen, 70pen, 71pen, 72 (map)

Lissodesmus sp. Pl.—Mesibov, 1996: 18.

Material examined. Holotype. Male, Australia, Tasmania, Fortescue Bay, EN762228 (43°08'36"S 147°56'13"E), 120 m, 11.iii.1992, R. Mesibov, QVM 23:45825 (ex QVM 23:16173).

Paratypes. Male, Griffiths Road, Koonya State Forest, approx. EN650270 (43°06'S 147°47'E), 19.xi.1977, J.L. Hickman, QVM 23:16170, dissected; male, details as for holotype, AM KS91183 (ex QVM 23:16173); male, details as for holotype, QVM 23:16173, dissected; male, Browns Creek, EN736463 (42°55'56"S 147°54'07"E), 190 m, 20.iii.1992, R. Mesibov, QVM 23:16172, dissected; stadium 7 male, stadium 6 male, 5 stadium 7 females, 2 stadium 6 females, same details, QVM 23:16175; male, Wellard Rivulet, EN730456 (42°56'18"S 147°53'40"E), 140 m, 24.ii.1993, R. Mesibov, QVM 23:16171, dissected; stadium 6 male, female, stadium 7 female, stadium 6 female, same details, QVM 23:16174; male, Mt Clark, approx. EN638267 (43°06'34"S 147°47'02"E), 250 m, 4.v.2002, K. Bonham, QVM 23:25021.

Description. Male c. 16 mm long, $H = 1.6$ mm. In alcohol, well-coloured specimens under low magnification pale to light brown in body colour, somewhat darker posteriorly on prozonites. Antennae long (Fig. 69pen), about 2.5× a socket diameter apart. Paranota wide, $R = 1.6$ (Fig. 70pen), anterior "shoulders" projecting forward, posterior corners not turned up. Legs long, moderately robust, tarsus slightly longer than femur, tibia

with slight ventral distal swelling (Fig. 71per). Telopodite (Figs 60, 61) almost reaching leg 5 when retracted. **Solenomere arising at just under half the telopodite height, directed posterodistally at c. 45° to telopodite axis, twisted slightly helically, the tip bending distally, terminating with no subapical projection at half the prefemoral process height.** Tibiotarsus unusually wide at base, initially parallel to solenomere but curving posterolaterally, then mesally, then distally; somewhat shorter than solenomere and terminating proximal to solenomere tip. **Femoral process arising just proximal to solenomere origin, blade-like, forked at about one-quarter its length and not pressed close to prefemoral process, the two branches apically pointed and about equal in size; anterior branch curved anteriorly, then distally, approaching prefemoral process apically; posterior branch arcuate, concave anteriorly, bent more strongly anteriorly near tip; the two branches terminating at the level of solenomere tip.** Prefemoral process at origin about two-thirds as wide as telopodite base, sharply narrowing at about one-third its length, the distal two-thirds gradually curving posteriorly, the tip mesolaterally flattened and not armed with teeth. Uncus large, arising laterally at level of solenomere tip, flattened posterobasally, the outer edge slightly crenulate.

Distribution and habitat. Known from wet eucalypt forest to 250 m elevation on Forestier and Tasman Peninsulas in south-east Tasmania (Fig. 72). *L. peninsulensis* appears to be uncommon and may have a total range of less than 200 km².

Etymology. Latin *peninsula* + *-ensis*, adjective, referring to the Forestier and Tasman Peninsulas.

Lissodesmus perporosus Jeekel, 1984

Figures 1, 10, 62, 63, 69per, 70per, 71per, 72 (map)

Lissodesmus perporosus Jeekel, 1984: 98.

Material examined. Holotype (not seen). Male, Australia, Tasmania. Hellyer Gorge, 32 km SSW of Somerset, 25.xi.1980, C.A.W. Jeekel and A. Jeekel-Rijvers. The type is said to be deposited in TM (Jeekel, 1984: 86), but has not yet been received there.

Paratypes. 6 males, 13 females, 3 stadium 7 males, 2 stadium 7 females, details as for holotype; male, 12 km SW of Derwent Bridge, 26.xi.1980, C.A.W. Jeekel and A. Jeekel-Rijvers; 2 males, 4 females, Lake St Clair National Park, near Cynthia Bay, 5 km WNW of Derwent Bridge, 26.xi.1980, C.A.W. Jeekel and A. Jeekel-Rijvers. These specimens are listed as paratypes by Jeekel (1984: 98) but their present locations are unknown and they have not been examined.

Other material. 550 males, 616 females and 328 juveniles from 333 localities (see "*Lissodesmus* supplement" for details).

Description. Male c. 18 mm long, *H* = 1.7 mm. In alcohol, under low magnification with near-white body colour and three transverse bands dorsally: reddish purple posteriorly on pronotites, red speckling anteriorly and light brown (mainly medially) posteriorly on metatergites. Antenna fairly short, stout (Fig. 69per). Paranota fairly wide, *R* = 1.5 (Figs 10D, 70per), posterior corners not turned up (Fig. 1). **Pore formula 5, 7, 9–19 in males and females.** Legs robust, tarsus about as long as femur, tibia with slight ventral distal swelling (Fig. 71per). Telopodite (Figs 62, 63) reaching leg 5 when retracted. Solenomere arising at about one-third the telopodite height,

directed posterodistally at a small angle (c. 30°) to telopodite axis, curving slightly laterally, terminating with toothed subapical collar at about one-third the prefemoral process height. Tibiotarsus somewhat larger than solenomere, directed at larger angle to telopodite axis, straight with tip bent anterodistally at a right angle. Femoral process arising just proximal to solenomere origin, blade-like, forked at about one-third its length; anterior branch directed distally, pointed, pressed close to prefemoral process, terminating at just over half the prefemoral process height (distal to solenomere tip); posterior branch about one-quarter as long as anterior branch and much narrower, directed posteriorly and curving slightly distally. Prefemoral process at origin about half the width of telopodite base, curving gradually posteriorly from about half the process height, the mesal edge distally with a few low, tooth-like projections. Small paired unci arising at about half the prefemoral process height (distal to solenomere tip) from middle of posterior surface and from mesal edge.

Distribution and habitat. In cool temperate rainforest, wet eucalypt forest, blackwood/tea-tree swamp forest and subalpine woodland over at least 20 000 km² in north-west Tasmania (Fig. 72), from sea level to at least 1150 m. The *L. perporosus* range extends from the west coast near Pieman Head to the eastern edge of the Central Plateau and to Notley Gorge in the West Tamar region, and from the Bass Strait coast near the Black River mouth to Tarraleah in the upper Derwent Valley. *L. perporosus* is the most abundant dalodesmid over most of its range. It occurs in *Pinus radiata* plantations (Bonham et al., 2002; Mesibov, 2005) as well as native vegetation and has been found in caves at Bubs Hill and Mole Creek.

Remarks. Size and coloration vary little in this species, and females and juveniles are easily recognised by the unusual pore formula. A single male *L. perporosus* from Trackham Creek near Waratah (QVM 23:17460) has a normal pore formula. Another 114 specimens from the same locality, including 28 males, have the *perporosus* formula, indicating that this Trackham Creek male is unique and not representative of a pore-formula "race" within the species. Gonopod structure also varies very little in *L. perporosus*, the gonopods of males from sites 200 km apart at Rebecca Creek and Dee Lagoon differing only slightly in size, number and position of teeth on the prefemoral process. The greatest deviation from the typical *perporosus* gonopod structure is found in the vicinity of Maggs Mountain in the upper Mersey River catchment. Males in this small area have additional tooth-like projections on the prefemoral process, and the tip of the process is thickened and bent over (Fig. 63).

Lissodesmus plomleyi sp. nov.

Figures 64, 69plo, 70plo, 71plo, 76 (map)

Lissodesmus sp. NE4.—Mesibov, 1996: 16.—Mesibov, 1998: 155.

Material examined. Holotype. Male, Australia, Tasmania. East of Rattler Hill, EQ743353 (41°13'49"S 147°53'12"E), 650 m, 18.i.2005, R. Mesibov, QVM 23:45893.

Paratypes. Male, Rattler Hill, EQ744353 (41°13'48"S 147°53'15"E), 650 m, 6.ix.1990, QVM 23:15466, dissected; female, Rattler Hill, EQ744353 (41°13'48"S 147°53'15"E), 650 m, 7.ix.1990, QVM

23:15468; female, Rattler Hill, EQ744353 (41°13'48"S 147°53'15"E), 650 m, 8.ix.1990, QVM 23:15467; male, Ben Nevis, EQ538147 (41°25'02"S 147°38'37"E), 890m, 15.iii.1993, QVM 23:15465, dissected; male, Caldbeck Creek, EQ471205 (41°21'55"S 147°33'47"E), 850 m, 26.xii.1994, R. Mesibov & T. Moule, AM KS91184 (formerly QVM 23:17758).

Description. Male c. 11 mm long, $H = 1.2$ mm. In alcohol, under low magnification very pale brown in body colour with darker brown speckling in narrow transverse band posteriorly on metatergites. Antennae short, clavate (Fig. 69plo), about 1.75 $\times$ a socket diameter apart. Paranota reduced, $R = 1.4$ (Fig. 70plo), posterior corners not turned up. Legs robust, tarsus longer than femur, tibia with prominent ventral distal swelling (Fig. 71plo). Epiproct with prominent paired, bluntly rounded projections. Telopodite (Fig. 64) widest near solenomere origin, reaching just past leg 6 when retracted. Solenomere arising at one-third the telopodite height, directed posterodistally at a small angle to telopodite axis, curving gradually laterally, terminating with small subapical projection at about one-quarter the prefemoral process height. Tibiotarsus roughly parallel to solenomere and about as wide but shorter, rod-like and pointed. Femoral process arising at level of solenomere origin, blade-like, forked at just over half its length; anterior branch basally pressed close to prefemoral process, directed distally, pointed and terminating at one-third to half the prefemoral process height (distal to solenomere tip); posterior branch short, wide, pointed, arising from anterior branch at right angle. **Prefemoral process at origin nearly as wide as telopodite base, slightly sinuous in anterior view, curving gradually posteriorly from about half its height, the distal third with a few very long, straight teeth on mesal edge directed basally and posterobasally and on lateral edge postero-basally.** Uncus prominent, deeply notched distally, arising from mesal side of prefemoral process at one-quarter to one-third the process height (distal to solenomere tip).

Distribution and habitat. Known from wet forest at three localities above 600 m in north-east Tasmania; the maximum distance between the localities is c. 30 km (Fig. 76). The *L. plomleyi* range has been carefully searched for millipedes and this species appears to be genuinely rare.

Etymology. In honour of Brian Plomley (1912-1994), Tasmanian scientist and scholar who encouraged biological research in north-east Tasmania.

Lissodesmus tarrabulga sp. nov.

Figures 65, 66, 69tar, 70tar, 71tar, 78 (map)

Material examined. Holotype. Male, Australia, Victoria, North-east of Balook, 38°24'52"S 146°34'15"E, 620 m, 22.xii.2004, R. Mesibov, NMV K-9636.

Paratypes. Male, Jeeralang West Road, 0.1 km N of Binns Hill Junction, 38°26'30"S 146°29'E, pitfall emptied 10.i.1996, G. Milledge, ex sample NOH-2303, NMV K-9631; male, same details but pitfall emptied 5.iii.1996, ex sample NOH-2304, NMV K-9632; 3 males, W of Balook, 38°26'25"S 146°31'00"E, 600 m, 29.ix.2004, R. Mesibov & T. Moule, NMV K-9633 to K-9635, 2 dissected; 2 males, details as for holotype, AM KS91185; male, details as for holotype, anterior segments only, NMV K-9637.

Description. Male c. 17 mm long, $H = 1.4$ mm. In alcohol, well-coloured specimens under low magnification pale brown in body colour with dispersed brown speckling on metatergites. Antennae moderately long (Fig. 69tar), about 1.75 $\times$ a socket diameter apart. Paranota wide, $R = 1.6$, lateral edge parallel to body axis, 2-3 inconspicuous posterior marginal teeth (Fig. 70tar), posterior corners not turned up. Legs robust, tarsus considerably longer than femur, tibia with prominent ventral distal swelling (Fig. 71tar). Telopodite (Figs 65, 66) reaching leg 6 when retracted. **Solenomere arising at half the telopodite height, directed distally, terminating at just over half the prefemoral process height, a rod-like, apically toothed, anteriorly directed projection arising at half the solenomere length on its anterior surface.** Tibiotarsus rod-like, pointed, directed posterodistally at small angle to telopodite axis, narrower than solenomere and about half as long. Femoral process arising at level of solenomere origin, blade-like, tapering, bluntly pointed, directed distally, not pressed close to prefemoral process, terminating at almost three-quarters the prefemoral process height (just distal to solenomere tip). **Prefemoral process at origin about half as wide as telopodite base, tapering strongly distally with simply pointed tip curving posteriorly.** Uncus prominent, arising on mesal side of prefemoral process at just over half the process height (just proximal to solenomere tip).

Distribution and habitat. Known from wet eucalypt forest at three sites over a 10 km section of the Strzelecki Ranges near Balook, in Gippsland (Fig. 78).

Etymology. Named for Tarra-Bulga National Park, the apparent centre of the small known range of this species.

Tasmanopeltis gen. nov.

Type species. *Tasmanopeltis grandis*, by present designation.

Diagnosis. Larger dalodesmids (30–35 mm long, 3.3 mm vertical diameter in type species) with head + 20 segments, normal pore formula, well-developed paranota with long posterior corner seta, hair-like structures arising from spiracles, spiracles on diplosegments juxtaposed over anterior leg. Telopodite straight, with small mesal solenomere and tibiotarsus, small lateral femoral process and large central prefemoral process. All processes arising at more than half the telopodite height; solenomere arising at almost two-thirds the telopodite height. Prefemoral process tip divided subapically into erect lateral branch with comb of long, mainly posterobasally directed teeth, and shorter, erect mesal branch with short, blunt, distally directed teeth.

Distribution. As for *T. grandis* sp. nov.

Etymology. A variation of *Australopeltis* Johns, 1964, which Johns probably derived from Latin *pelta* ("shield"); masculine.

Remarks. *Tasmanopeltis* is distinguished from *Lissodesmus* by its unusually large size (nearly two and a half times the calculated body volume of the next largest species, *L. montanus*, and more than 10 times that of the type, *L. modestus*); spiracles close together and with hair-like structures; process origins more than halfway along the telopodite; and a large, distal

projection on the prefemoral process, mesal to the latter's comb-like tip.

Tasmanopeltis grandis sp. nov.

Figures 5B, 67, 68, 69gra, 70gra, 71gra, 75 (map)

Lissodesmus sp. NE1.—Mesibov, 1994: 134.—Mesibov, 1996: 17.—Mesibov, 1997: 567.—Mesibov, 1998: 155.

Material examined. Holotype. Male, Australia, Tasmania. Speck Creek, EQ557542 (41°03'41"S 147°39'46"E), 330 m, 18.iii.1993, R. Mesibov, QVM 23:15555.

Paratypes. Male, Tin Hut Creek, EQ930505 (41°05'28"S 148°06'26"E), 140 m, 19.i.1989, R. Bashford, QVM 23:40767, pitfall; male, Eagle Hill, EQ550581 (41°01'34"S 147°39'15"E), 170 m, 10.iii.1993, R. Mesibov, AM KS91186 (ex QVM 23:15567); male, same details, QVM 23:15567; female, Speck Creek, EQ558537 (41°03'57"S 147°39'50"E), 150 m, 10.iii.1993, R. Mesibov, QVM 23:15598; male, Speck Creek, EQ576538 (41°03'53"S 147°41'07"E), 230 m, 10.iii.1993, R. Mesibov, QVM 23:15554, dissected; male, Mt Horror, EQ604547 (41°03'23"S 147°43'07"E), 220 m, 18.iii.1993, R. Mesibov, QVM 23:15557, dissected; male, Mt Horror, EQ588513 (41°05'14"S 147°42'00"E), 200 m, 24.iv.1993, R. Mesibov, QVM 23:15558; male, Mt Dismal area, EQ072330 (41°15'15"S 147°05'09"E), 320 m, 20.i.1995, R. Mesibov, QVM 23:17762; male, Ben Lomond, EQ483057 (41°29'55"S 147°34'43"E), 720 m, 16.vi.1995, R. Mesibov, QVM 23:21516.

Other material. 41 males, 49 females and 90 juveniles from Ansons River, "Aplico" property, Arnon River, Back Creek, Barrow Creek, Bell Creek, Ben Lomond, Ben Nevis, Blacksnake Marsh, Brady Kayes Lookout, Branhholm, Burns Creek, Caldbeck Creek, Carneys Creek, Chinaman Corner, Constance Creek, Duncraggen Hill, Eagle Hill, Foons Hill, Friend Creek, Glennons Road, Great Forester River, Harrys Hill, Hogarth Rivulet, Ikes Creek, Jewells Creek, Joseph Creek, Kamona, Martins Hill, Monazite Creek, Morris Ridge, Mother Logans Creek, Mt Arthur, Mt Cameron, Mt Dismal, Mt Horror, Mt Stronach, Musselboro, North Esk River, Northallerton Valley, Nunamara, Ockerbys Hills, Oxberry Creek, Patersonia, Pearly Brook, Rattler Hill, Scottsdale Mine, Sideling Range, Simons Road, Speck Creek, Spurs Rivulet, Swancee Creek, Telita, Tin Hut Creek, Traills Point, Weavers Creek, Wild Pig Hill, Williams Creek, Williams Hill and Wyena (see "*Lissodesmus* supplement" for details).

Description. Male c. 32 mm long, $H = 3.3$ mm. In alcohol, well-coloured specimens red- to purple-brown dorsally, pale yellow-orange laterally, ventrally and on legs; at low magnification with fairly uniform red- to purple-brown colouring on metazonite, pale yellow-orange on paranotal and posterior metazonal margins, somewhat darker red- to purple brown on head and prozonites, legs darker dorsally, distal podomeres and antennae pale red. Antennae (Fig. 69gra) moderately long, slender, separated by about $2\times$ socket diameter, sockets not deeply impressed; antennomere 6 widest, antennomere lengths typically decreasing in order 2, 3, 6, (4,5). Head with clypeus and frons densely setose, vertex bare; vertical sulcus extending to point about $1.5\times$ socket diameter from line joining socket centres. Collum from above slightly wider than head, with nearly straight anterior border, steeply sloping shoulders, rounded posterior corners, slightly convex posterior margin with emarginate centre; posterior corner setae present and a few long setae in transverse line behind anterior margin and centrally; collum corners slightly ventral to paranotal margin of

segment 2. Paranota (Fig. 70gra) increasing in width from segment 2 to 5, fairly uniform in width posteriorly to segment 16, narrowing thereafter; paranota wide, $R = 1.8$ on segment 12; lateral margins more convex and posterior corners more produced posteriorly, on most segments the paranota widest anteriorly; lateral margins with 3-4 notches, typically each with short seta, the most anterior notch with longest seta, sometimes as long as posterior corner seta, the latter arising on most segments on mesal side of projecting posterior corner, close to base of latter; the margins straight in lateral view but inclined upwards posteriorly at c. 15° to horizontal. Segment surfaces smooth, metatergites bare apart from short, sparse setae in 2-3 transverse rows anteriorly. Pore formula 5, 7, 9, 10, 12, 13, 15-19; ozopore opening dorsolaterally on paranotum at about three-quarters the distance from anterior to posterior paranotal margins, close to lateral margin. Spiracles (Fig. 5B) enlarged, on diplosegments the posterior spiracle almost touching anterior spiracle over anterior leg, rims very thin, projecting, all spiracles with dense mass of emergent hair-like structures. Sternite tetrads longer than wide, transverse furrow deep, longitudinal furrow less deep. Legs (Fig. 71gra) variably swollen from segment 3 posteriorly, mostly with strongly arched prefemur, slightly arched femur, slight ventral distal swellings on postfemur and tibia; tarsus slightly curved; podomere lengths decreasing in order tarsus, femur, prefemur, (postfemur, tibia); dense "brush" setae on prefemur, femur, postfemur; sphaerotrichomes on all five podomeres on legs near gonopods; leg 2 coxa with genital opening on mesodistal swelling, only slightly raised above coxal surface; paired coxae of legs 6 and 7 well separated, slightly separated on legs 5, not separated on legs 4. Gonopod aperture about one-third as wide as segment 7 prozonite, more or less rectangular (wider than long) with rounded corners in ventral view, in lateral view with lateral margin strongly produced posteriorly. Gonopod coxae entirely contained within aperture, fairly small, more or less ellipsoid, lightly joined along midline distally, with dense, short setae on ventromesal surface distally; cannulae prominent. Telopodites (Figs 67, 68) separate, straight, lightly setose posteriorly from base to level of solenomere origin, reaching leg 5 when retracted. **Solenomere arising from anteromesal surface of telopodite at almost two-thirds the telopodite height, directed posterodistally at somewhat less than 45° to telopodite axis, curving very slightly laterally, tapering gradually, tip curving distally, no subapical projection or similar structure, terminating at about four-fifths the telopodite height (about two-thirds the prefemoral process height).** Tibiotarsus arising a little posterior and distal to solenomere and more or less parallel to it, rod-like, bluntly pointed, about one-third the solenomere length. Femoral process arising just proximal to solenomere origin on antero-lateral surface, mesolaterally flattened, pressed close near origin to prefemoral process, widening distally with truncate, sinuous, inconspicuously toothed distal edge, terminating at just over half the prefemoral process height (proximal to solenomere tip). **Prefemoral process at origin about half as wide as telopodite base, widening distally and dividing at about half its height into well-separated lateral and mesal branches; lateral branch curving posteriorly with a comb of**

10–15 long, straight, mainly posterobasally directed teeth on mesal edge; mesal branch one-third to one-half the height of lateral branch (terminating just distal to solenomere tip), bluntly pointed with mesal surface armed with 3–4 short, blunt, posterodistally directed teeth. Uncus a large posterior extension of mesal edge of prefemoral process just proximal to solenomere tip, widely notched on outer edge. Hypoproct paraboloid in outline; preanal ring with numerous long setae; epiproct projecting well past anal valves, in dorsal outline triangular with truncated apex. Female slightly larger than male, c. 35 mm long, legs thinner, otherwise with same coloration, paranotal form and spiracle features. Posterior rim of epigynal opening strongly produced, with rounded corners and elevated central portion; cyphopods not examined.

Distribution and habitat. In dry and wet eucalypt forest and cool temperate rainforest over c. 3500 km² in north-east Tasmania (Fig. 75), from Mt Dismal in the Tamar Valley east to Ansons River, from Gladstone south to Ben Lomond, and from near sea level to 920 m. The western range boundary of *T. grandis* lies within the biogeographical divide known as the East Tamar Break (Mesibov, 1994), and is particularly sharp near Weavers Creek (Mesibov, 1997). Adults of *T. grandis* are generally found in or under rotting logs and only rarely burrow into the soil.

Etymology. Latin *grandis* ("large, magnificent"), adjective.

Remarks. Although *T. grandis* is the largest polydesmidan in Tasmania, it is remarkably cryptic in its habits, and the first known museum specimen was collected less than 20 years ago (on Mt Arthur in 1987).

Acknowledgements

This study was supported by a grant from the Plomley Foundation. I thank David Steele (University of Tasmania) for acquiring the SEM images; Gonzalo Giribet (Harvard University) for access to the *Lissodesmus modestus* types; Peter Lillywhite (Museum Victoria) for the loan of specimens; Genefer Walker-Smith (Tasmanian Museum and Art Gallery) and Cathy Young (Department of Primary Industries, Water and Environment, Tasmania) for advice on millipede holdings; Dennis Black (La Trobe University) for the opportunity to examine the Lower Gordon River Scientific Survey material held in the Australian National Insect Collection; and Mark Harvey (Western Australian Museum) for alerting me to his collection of *L. milledgei*. I am grateful to Geoff and Jackie Tims for inviting me to collect on "Lapoinya", near Yarragon, and to other Gippsland landowners who allowed me access to their properties. I am especially grateful to my wife, Trina Moule, for her able assistance in the field over many years. A draft of this paper was greatly improved by comments from Mark Harvey and Gary Poore.

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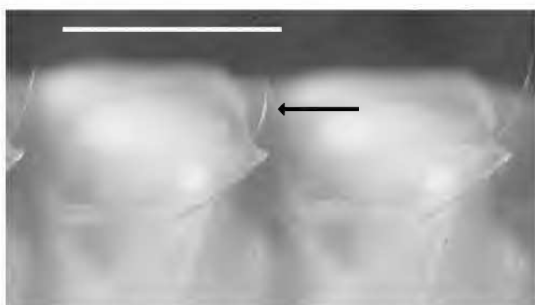


Figure 1. *Lissodesmus perporosus* Jeekel, 1984, male. Left lateral view of midbody paranotum, showing posterior corner seta (arrow). Scale bar = 1.0 mm.



Figure 4. (A) *L. modestus* Chamberlin, 1920, male from Edwards Road, Huon River, ex QVM 23:15294; (B) *L. hamatus* sp. nov., male paratype ex QVM 23:16073; (C) *L. anas* sp. nov., male paratype ex QVM 23:17657. Left lateral SEM views of midbody segment, showing nearly straight paranotal margin (A), slightly upturned posterior corner (B) and strongly upturned posterior corner (C). Scale bars = 0.5 mm.

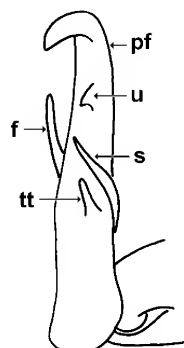


Figure 2. Diagrammatic posteromesal view of the right gonopod telopodite of a member of the *Lissodesmus* group. f = femoral process, pf = prefemoral process, s = solenomere, tt = tibiotarsus, u = uncus.

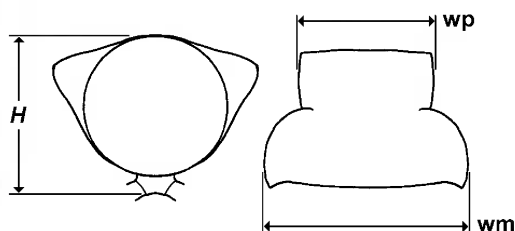


Figure 3. Diagrammatic posterior (left) and dorsal (right) views of a polydesmidan midbody segment, showing measurement limits for height H , prozonite width w_p and paranotal width w_m . Relative paranotal width $R = w_m/w_p$.

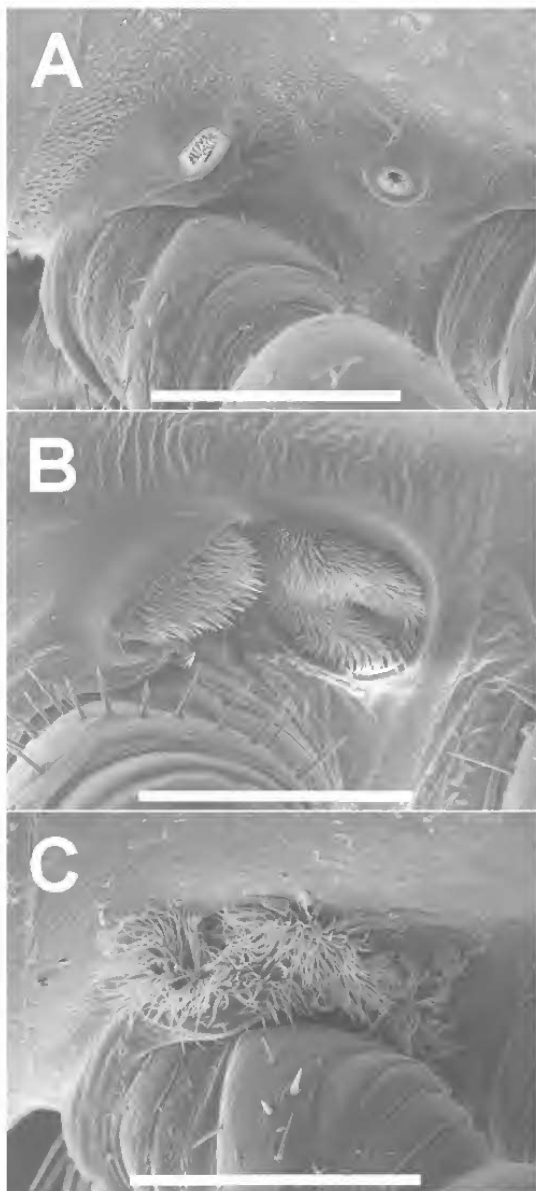


Figure 5. (A) *L. modestus* Chamberlin, 1920, male from Edwards Road, Huon River, ex QVM 23:15294; (B) *Tasmanopeltis grandis* gen. et sp. nov., male paratype, QVM 23:15554; (C) *L. anas* sp. nov., male paratype ex QVM 23:17657. Left lateral SEM views of midbody segment, showing spiracles. Scale bars = 0.25 mm (A, C) and 0.35 mm (B).

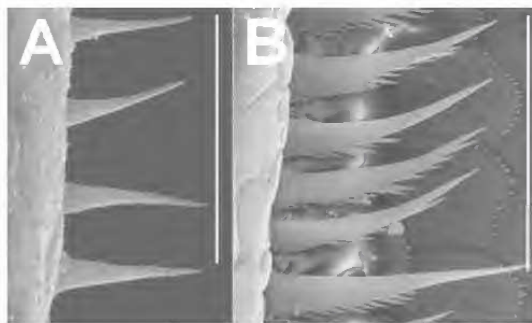


Figure 6. (A) *L. latus* sp. nov., male paratype ex QVM 23:17490, (B) *L. hamatus* sp. nov., male paratype ex QVM 23:16073. SEM views of a group of limbus elements on a midbody segment. Scale bars = 0.025 mm; anterior is to the left.

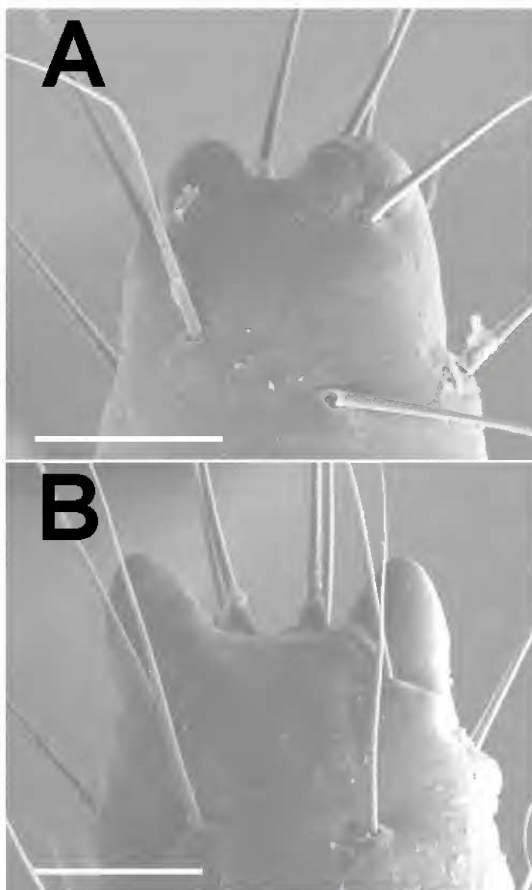


Figure 7. (A) *L. modestus* Chamberlin, 1920, male from Edwards Road, Huon River, ex QVM 23:15294; (B) *L. adrianae* Jeekel, 1984, male ex QVM 23:21220. Dorsal SEM views of epiproct. Scale bars = 0.1 mm.

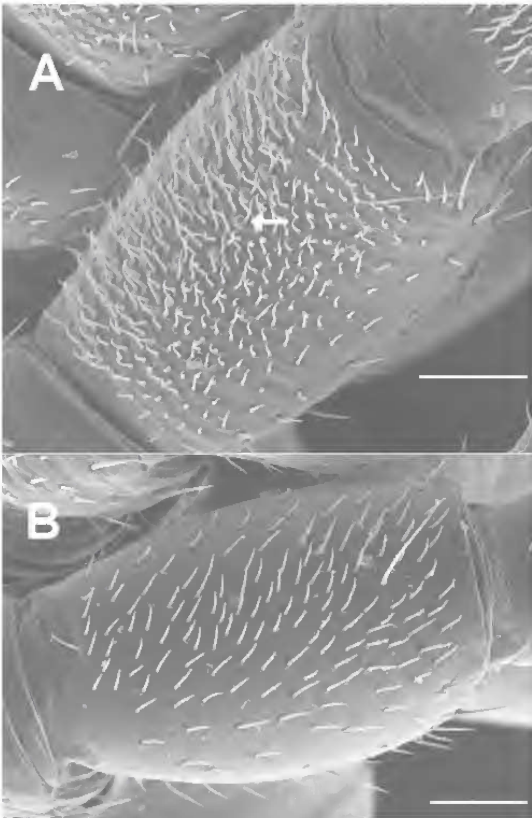


Figure 8. (A) *L. modestus* Chamberlin, 1920, male from Edwards Road, Huon River, ex QVM 23:15294; (B) *L. orarius* sp. nov., male paratype ex QVM 23:17683. Ventral SEM views of leg 6 prefemur in situ. Arrow points to one of seven sphaerotrichomes visible among “brush” setae on *L. modestus* prefemur; sphaerotrichomes are lacking on *L. orarius* prefemur. Scale bars = 0.1 mm.

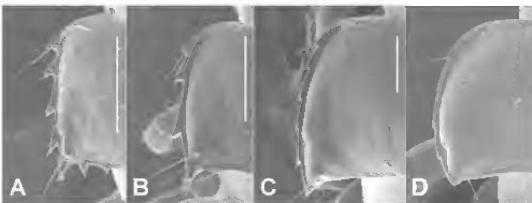


Figure 10. *L. perporosus* Jeekel, 1984, males from Wombat Hill, W of Waratah. SEM views of paranotal margin of midbody segment. (A) stadium 5, ex QVM 23:17291; (B) stadium 6, ex QVM 23:17291; (C) stadium 7, ex QVM 23:17291; (D) stadium 8, ex QVM 23:17429. Scale bars = 0.25 mm.

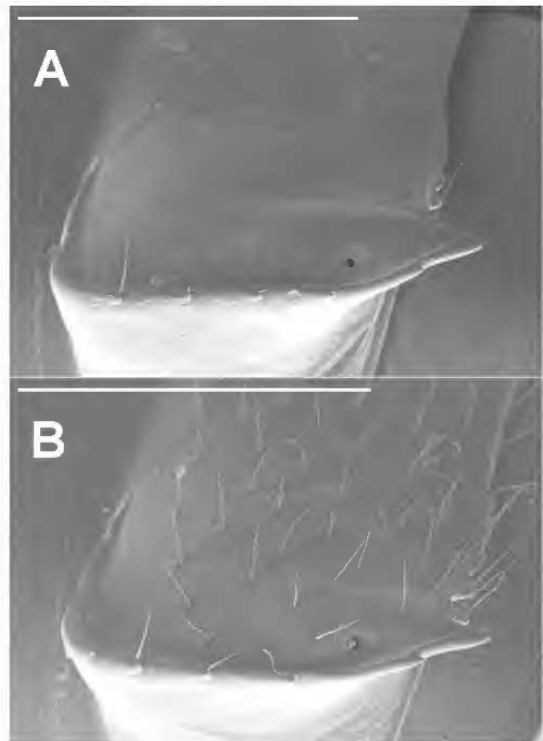


Figure 9. *L. latus* sp. nov., females. Left dorsolateral SEM views of midbody segment of typical form (A) from Sterling River, QVM 23:17525, and furry form (B) from S of Mt Cripps, ex QVM 23:17516.



Figure 11. *L. adrianae* Jeekel, 1984, male from Ben Lomond, ex QVM 23:21220. SEM view of gonopods in situ. Scale bar = 0.5 mm.

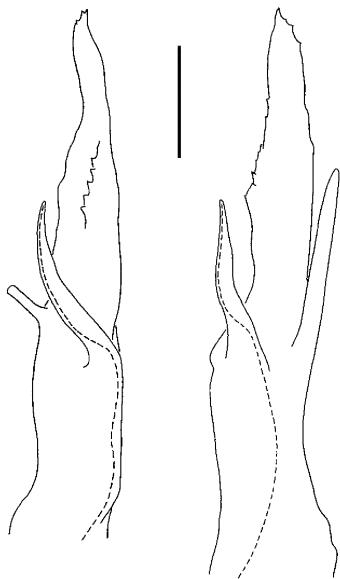


Figure 12. *L. adrianae* Jeekel, 1984, male from Ben Lomond, ex QVM 23:21220. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

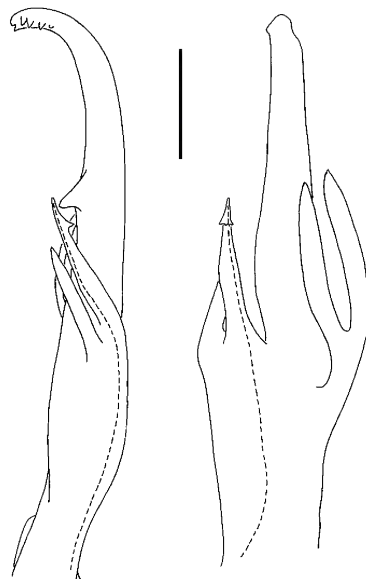


Figure 13. *L. alisonae* Jeekel, 1984, male from Franklin Village, ex QVM 23:15440. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

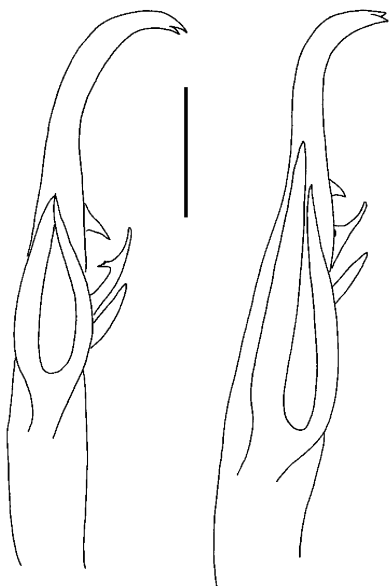


Figure 14. *L. alisonae* Jeekel, 1984, males from Franklin Village near Launceston (left), ex QVM 23:15440, and "Bowood" property near Bridport (right), ex QVM 23:15442. Lateral views of right gonopod telopodite. Scale bar = 0.25 mm.



Figure 15. *L. anas* sp. nov., male paratype ex QVM 23:17657. SEM view of gonopods in situ. Scale bar = 0.5 mm.

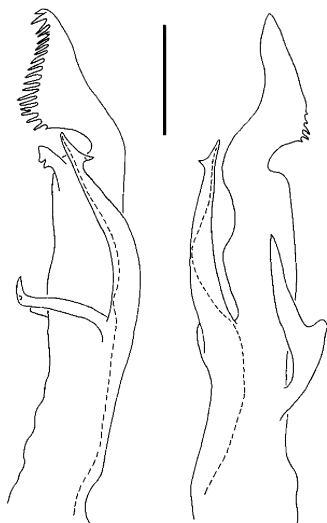


Figure 16. *L. anas* sp. nov., male paratype ex QVM 23:40749. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

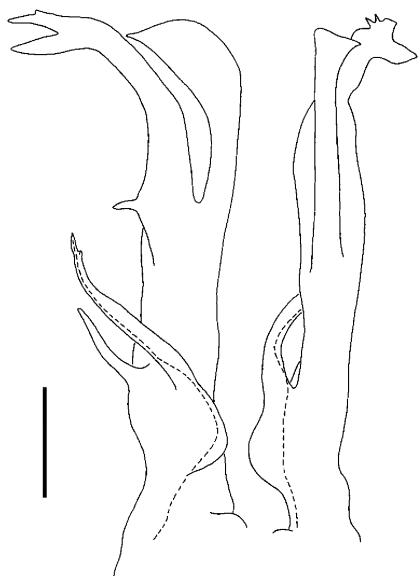


Figure 18. *L. bashfordi* sp. nov., male paratype ex QVM 23:45946. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 17. *L. bashfordi* sp. nov., male paratype ex QVM 23:45946. SEM view of gonopods in situ. Scale bar = 0.5 mm.



Figure 19. *L. blackwoodensis* sp. nov., male paratype, NMV K-8923. SEM view of gonopods in situ. Scale bar = 0.5 mm.

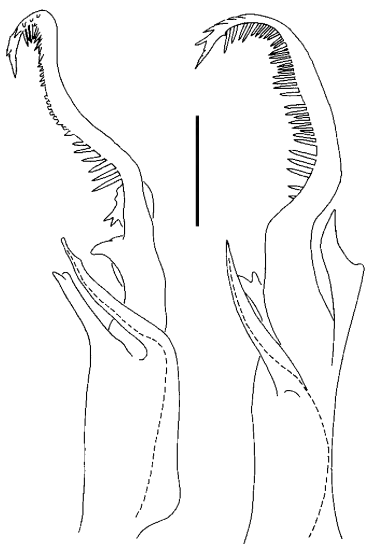


Figure 20. *L. blackwoodensis* sp. nov., male paratype, NMV K-8924. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

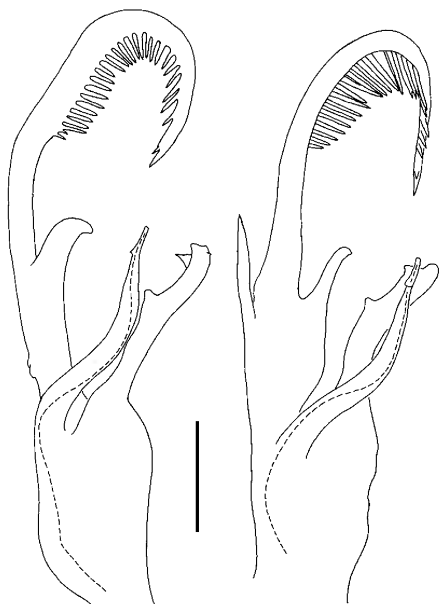


Figure 22. *L. catrionae* sp. nov., male paratype, NMV K-8971. Mesal (left) and anterior (right) views of left gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

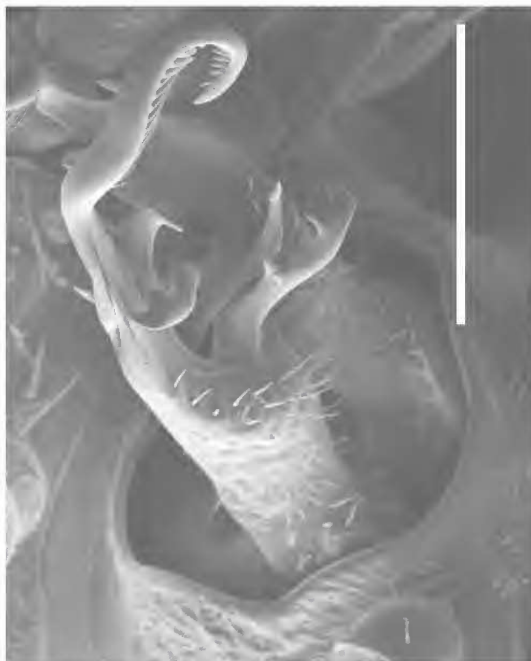


Figure 21. *L. catrionae* sp. nov., male paratype, NMV K-8970. SEM view of right gonopod in situ. Scale bar = 0.5 mm.



Figure 23. *L. clivulus* sp. nov., male paratype ex QVM 23:17667. SEM view of gonopods in situ. Scale bar = 0.5 mm.

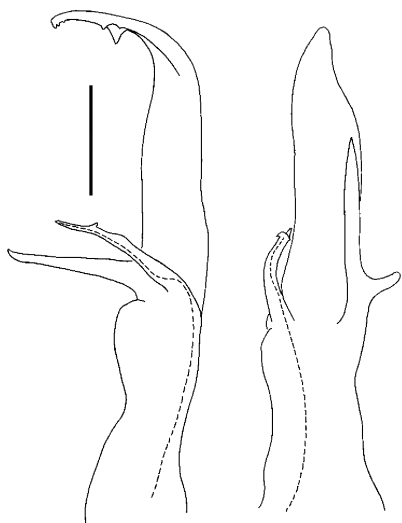


Figure 24. *L. clivulus* sp. nov., male paratype ex QVM 23:17667. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 25. *L. cognatus* sp. nov., male paratype ex QVM 23:15283. SEM view of gonopods in situ. Scale bar = 0.5 mm.

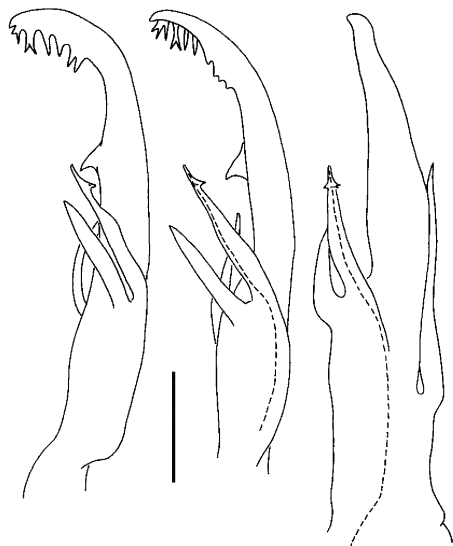


Figure 26. *L. cognatus* sp. nov., male paratypes from Coxs Creek in the eastern range patch (far left), ex QVM 23:24738, and Weavers Creek in the western range patch (centre and right), ex QVM 23:21562. Mesal (left and centre) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

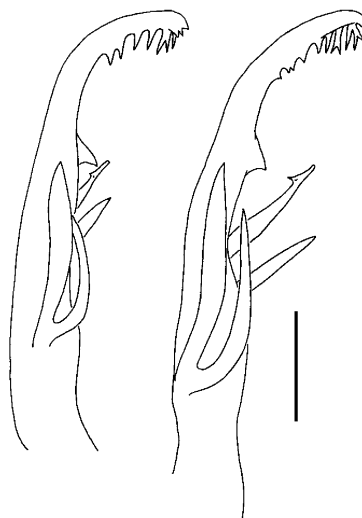


Figure 27. *L. cognatus* sp. nov., male paratypes from Coxs Creek in the eastern range patch (left), ex QVM 23:24738, and Weavers Creek in the western range patch (right), ex QVM 23:21562. Lateral views of right gonopod telopodite. Scale bar = 0.25 mm.

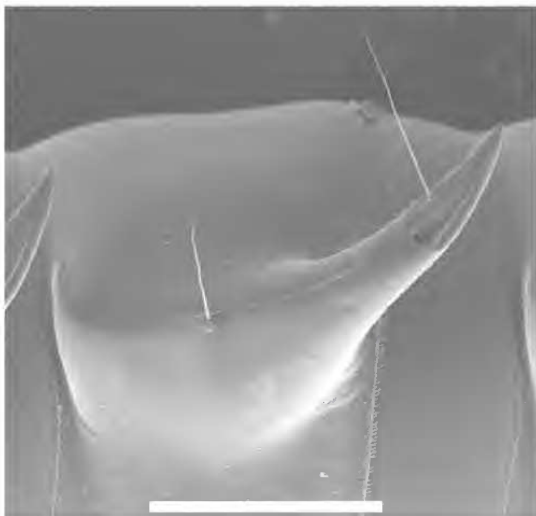


Figure 28. *L. cornutus* sp. nov., male paratype ex QVM 23:24824. Left lateral SEM view of midbody segment. Scale bar = 0.5 mm.



Figure 29. *L. cornutus* sp. nov., male paratype ex QVM 23:24824. SEM view of gonopods in situ. Scale bar = 0.5 mm.

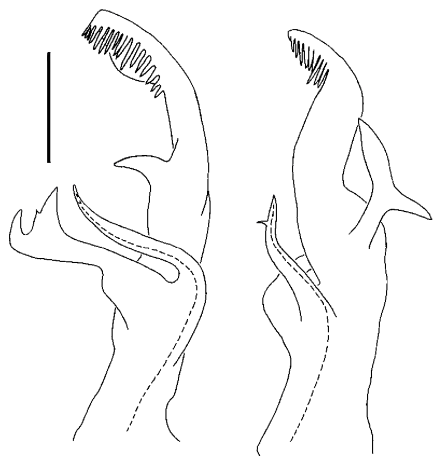


Figure 30. *L. cornutus* sp. nov., male paratype ex QVM 23:24824. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 31. *L. devexus* sp. nov., male paratype from Shepherds Rivulet, 6 km SE of the type locality, ex QVM 23:15509. SEM view of gonopods in situ. Scale bar = 0.5 mm.

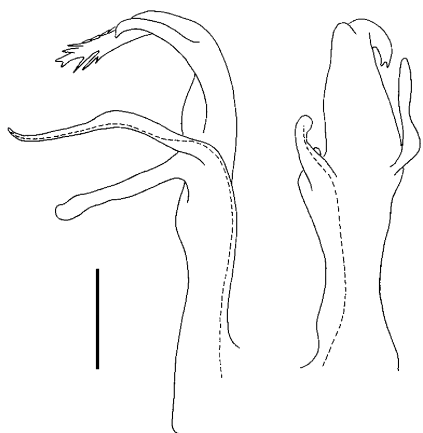


Figure 32. *L. devexus* sp. nov., male paratype ex QVM 23:15515. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

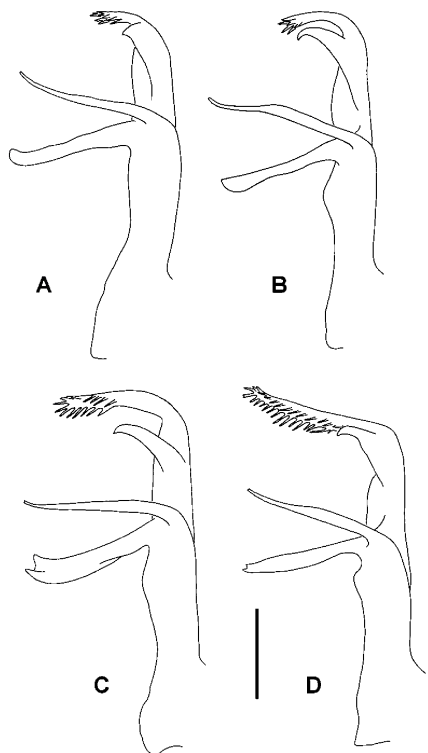


Figure 33. *L. devexus* sp. nov., male paratypes from (A) Retreat, ex QVM 23:21534, (B) Weldborough, QVM 23:15512, (C) Mt Roland, ex QVM 23:15506 and (D) Lowes Mount, QVM 23:21542. Mesal views of right gonopod telopodite. Scale bar = 0.25 mm.



Figure 34. *L. dignomontis* sp. nov., male paratype, NMV K-9664. SEM view of gonopods in situ. Scale bar = 0.5 mm.

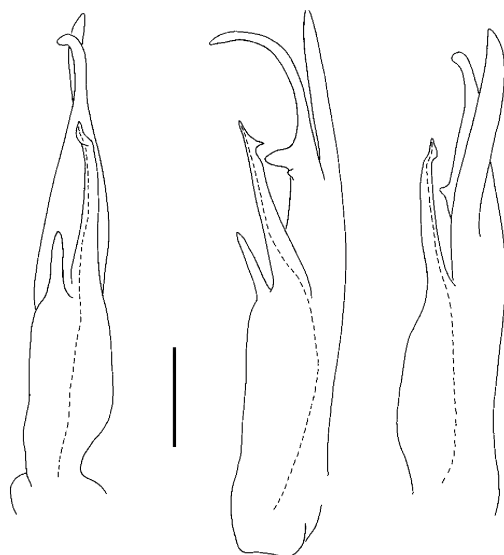


Figure 35. *L. dignomontis* sp. nov., male paratype, NMV K-9507. Posterior (left), mesal (centre) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 36. *L. gippslandicus* sp. nov., male paratype, NMV K-9483. SEM view of gonopods in situ. Scale bar = 0.5 mm.

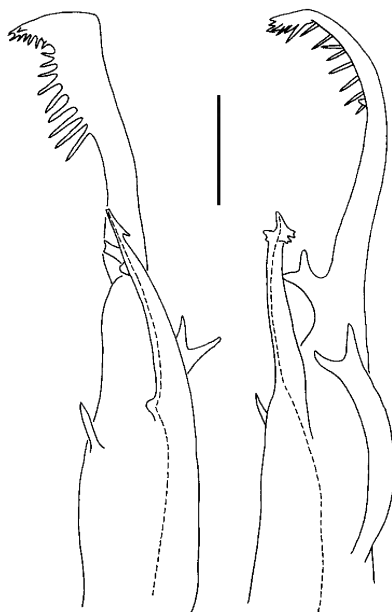


Figure 37. *L. gippslandicus* sp. nov., male paratype, NMV K-9484. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 38. *L. hamatus* sp. nov., male paratype ex QVM 23:16073. SEM view of gonopods in situ. Scale bar = 0.5 mm.

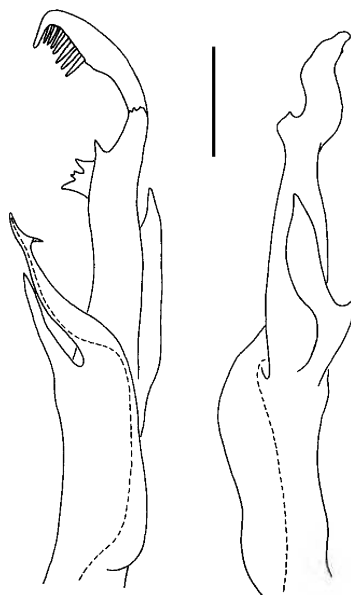


Figure 39. *L. hamatus* sp. nov., male paratype ex QVM 23:16073. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 40. *L. horridomontis* sp. nov., male paratype ex QVM 23:15490. SEM view of gonopods in situ. Scale bar = 0.5 mm.

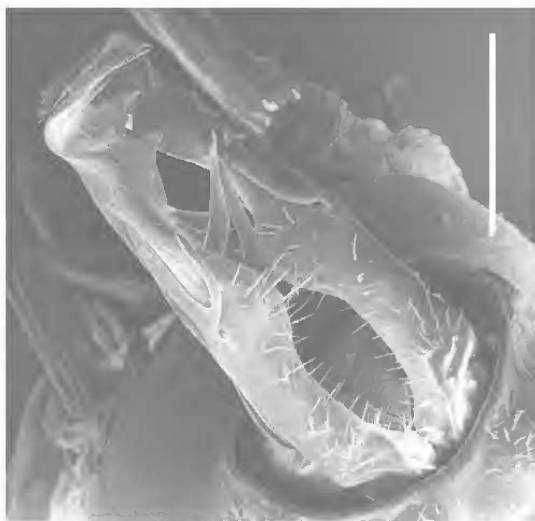


Figure 42. *L. inopinatus* sp. nov., male paratype ex QVM 23:16164. SEM view of gonopods in situ. Scale bar = 0.5 mm.

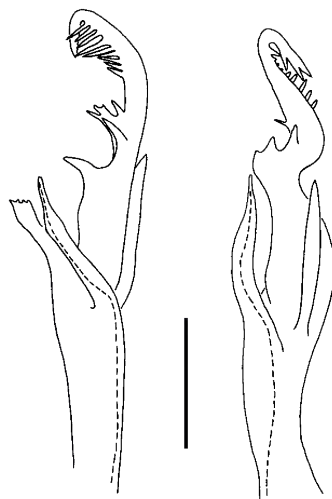


Figure 41. *L. horridomontis* sp. nov., male paratype ex QVM 23:15490. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

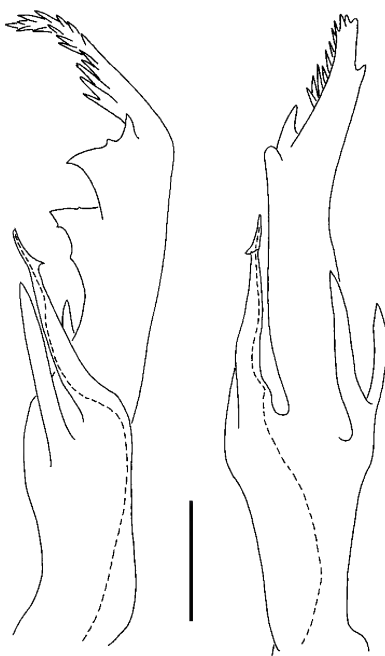


Figure 43. *L. inopinatus* sp. nov., male paratype ex QVM 23:16164. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 44. *L. johnsi* sp. nov., male paratype, NMV K-9683. SEM view of gonopods in situ. Scale bar = 0.5 mm.



Figure 47. *L. macedonensis* sp. nov., male paratype, NMV K-9511. SEM view of gonopods in situ. Scale bar = 0.5 mm.

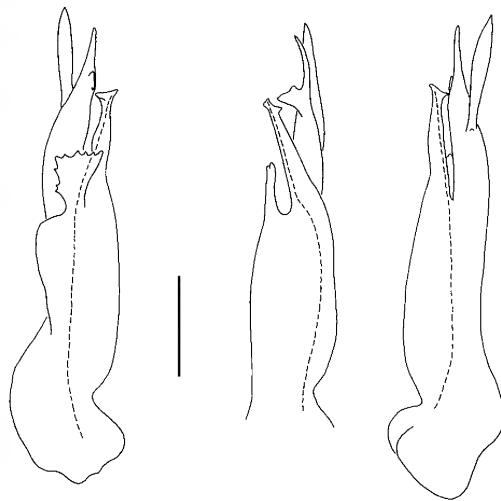


Figure 45. *L. johnsi* sp. nov., male paratype, NMV K-9506. Posterior (left), mesal (centre) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

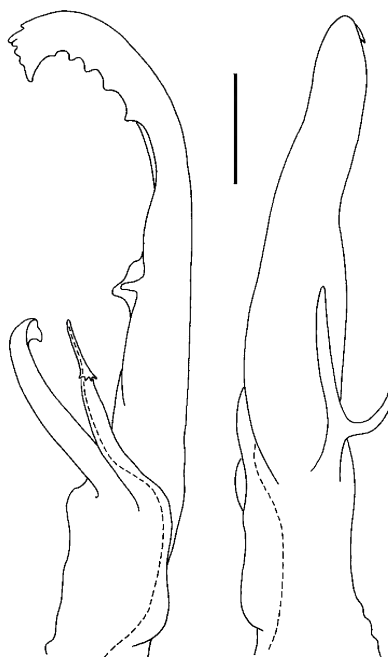


Figure 46. *L. latus* sp. nov., male paratype ex QVM 23:17490. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

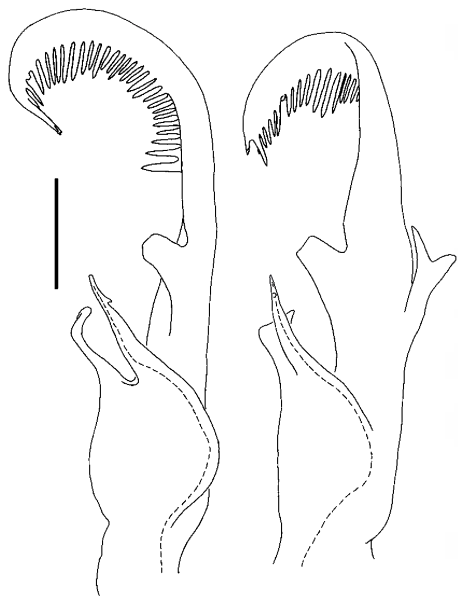


Figure 48. *L. macedonensis* sp. nov., male paratype, NMV K-9512. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 49. *L. martini* (Carl, 1902), male from Acheron Gap area, NMV K-9590. SEM view of gonopods in situ. Scale bar = 0.5 mm.

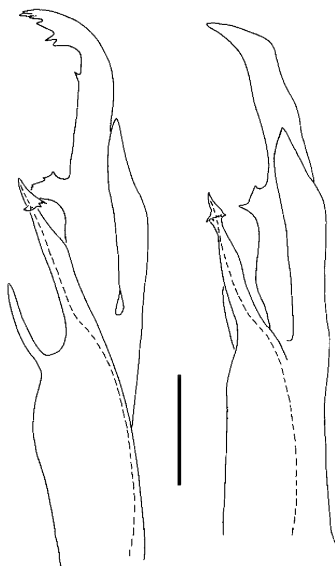


Figure 50. *L. martini* (Carl, 1902), male from Acheron Gap area, NMV K-9591. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

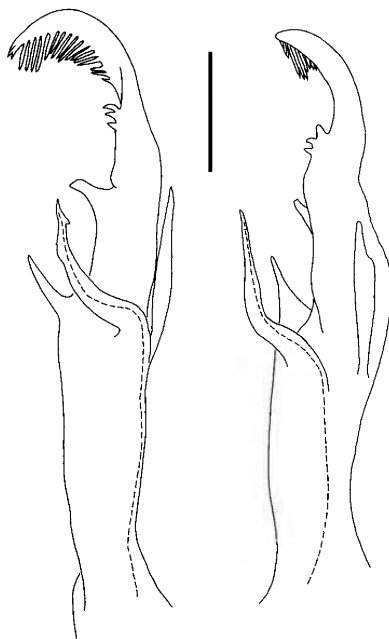


Figure 51. *L. milledgei* sp. nov., male paratype, NMV K-9606. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 52. *L. modestus* Chamberlin, 1920, male from Edwards Road, Huon River, ex QVM 23:15294. Posterior SEM view of gonopods in situ. Scale bar = 0.5 mm.



Figure 54. *L. montanus* sp. nov., male paratype, QVM 23:17716. SEM view of gonopods in situ. Scale bar = 0.5 mm.



Figure 53. *L. modestus* Chamberlin, 1920, male from Edwards Road, Huon River, ex QVM 23:15294. Mesal view of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 55. *L. montanus* sp. nov., male paratype, QVM 23:17715. Mesal view of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 56. *L. orarius* sp. nov., male paratype ex QVM 23:17683. SEM view of gonopods in situ. Scale bar = 0.5 mm.



Figure 58. *L. otwayensis* sp. nov., male paratype, NMV K-9620. SEM view of gonopods in situ. Scale bar = 0.5 mm.

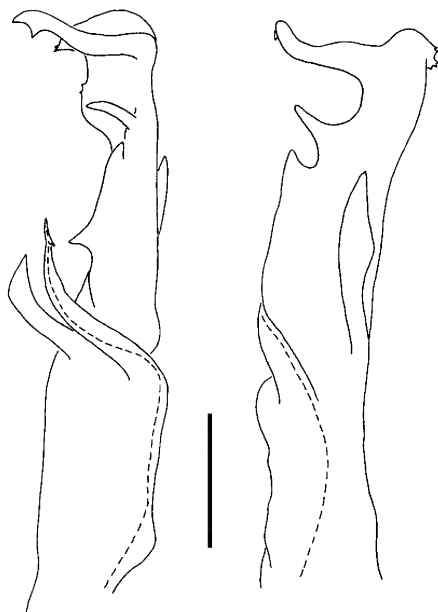


Figure 57. *L. orarius* sp. nov., male paratype ex QVM 23:17693. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

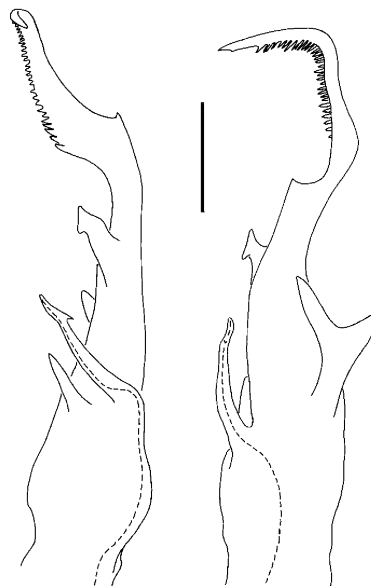


Figure 59. *L. otwayensis* sp. nov., male paratype, NMV K-9619. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 60. *L. peninsulensis* sp. nov., male paratype, QVM 23:16173. SEM view of gonopods in situ. Scale bar = 0.5 mm.



Figure 62. *L. perporosus* Jeckel, 1984, male from Wombat Hill, W of Waratah, ex QVM 23:17419. SEM view of right gonopod in situ. Scale bar = 0.5 mm.

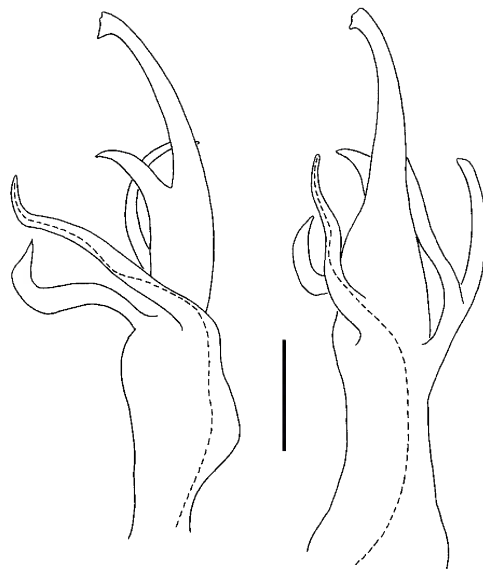


Figure 61. *L. peninsulensis* sp. nov., male paratype, QVM 23:16172. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

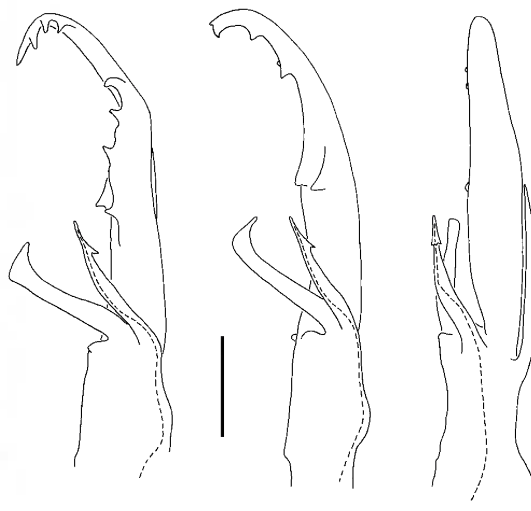


Figure 63. *L. perporosus* Jeckel, 1984, males from Wombat Hill, W of Waratah (centre and right), ex QVM 23:17419, and Maggs Mountain (left), QVM 23:17411. Mesal (left and centre) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

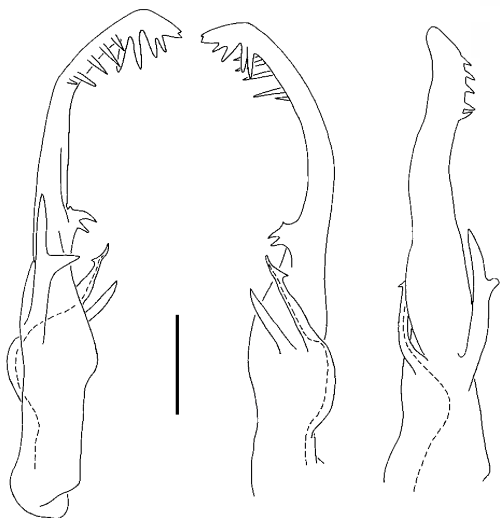


Figure 64. *L. plumleyi* sp. nov., male paratype, QVM 23:15465. Lateral (left), mesal (centre) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 65. *L. tarrabulga* sp. nov., male paratype, NMV K-9634. SEM view of gonopods in situ. Scale bar = 0.5 mm.

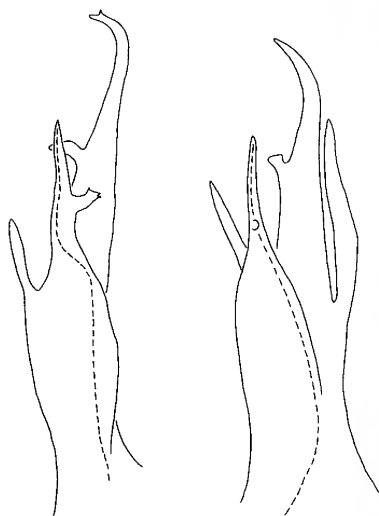


Figure 66. *L. tarrabulga* sp. nov., male paratype, NMV K-9635. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.



Figure 67. *Tasmanopeltis grandis* gen. et sp. nov., male paratype, QVM 23:15554. SEM view of gonopods in situ. Scale bar = 1.0 mm.

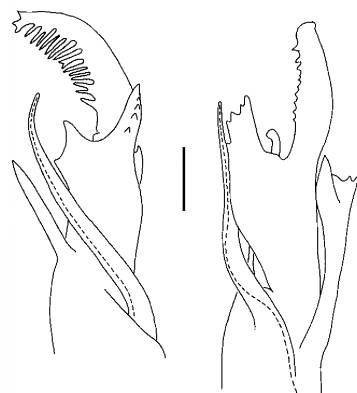


Figure 68. *Tasmanopeltis grandis* gen. et sp. nov., male paratype, QVM 23:15557. Mesal (left) and anterior (right) views of right gonopod telopodite. Dashed lines indicate course of prostatic groove; scale bar = 0.25 mm.

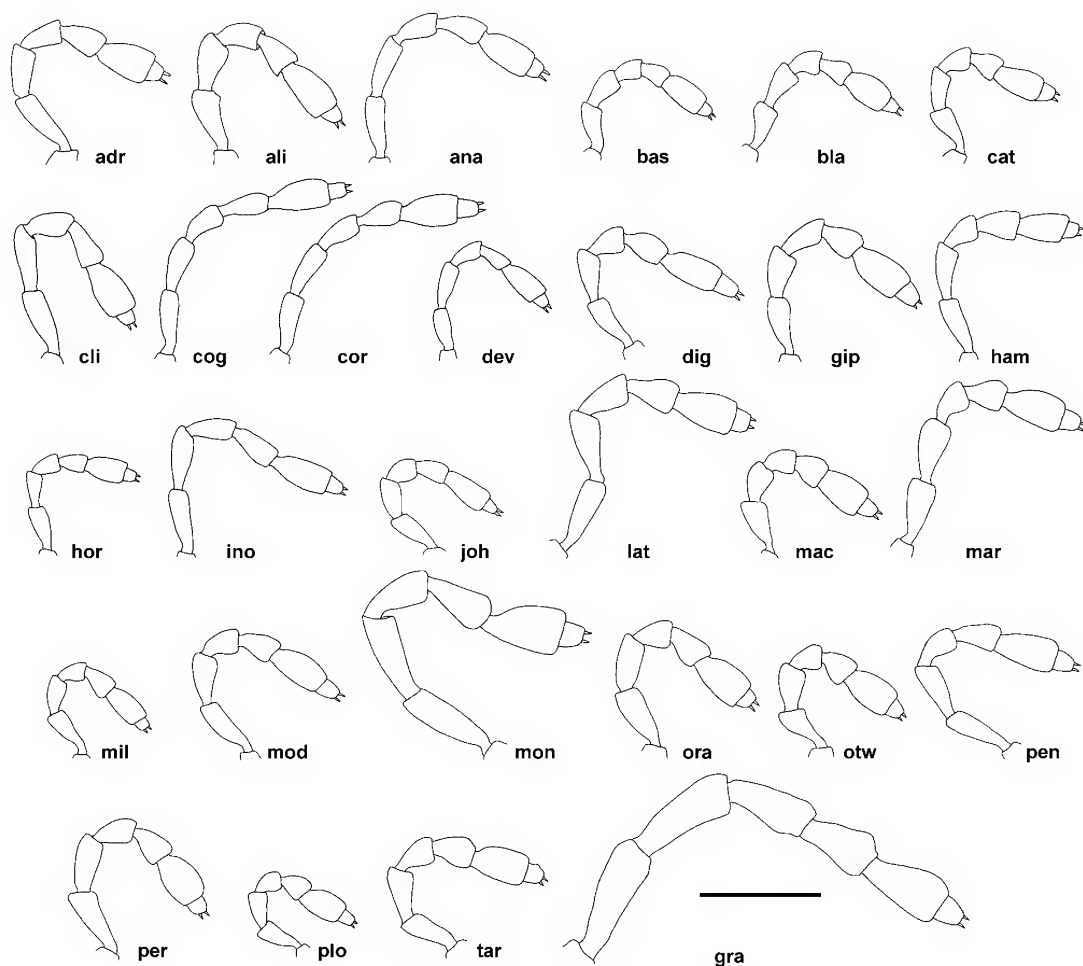


Figure 69. Male antennae of *Lissodesmus adrianae* Jeekel, 1984 (**adr**; ex QVM 23:21220), *L. alisonae* Jeekel, 1984 (**ali**; ex QVM 23:15440), *L. anas* sp. nov. (**ana**; paratype ex QVM 23:40749), *L. bashfordi* sp. nov. (**bas**; paratype ex QVM 23:45946), *L. blackwoodensis* sp. nov. (**bla**; paratype, NMV K-8924), *L. catrionae* sp. nov. (**cat**; paratype, NMV K-8971), *L. clivulus* sp. nov. (**cli**; paratype ex QVM 23:17667), *L. cognatus* sp. nov. (**cog**; paratype ex QVM 23:24738), *L. cornutus* sp. nov. (**cor**; paratype ex QVM 23:24824), *L. devexus* sp. nov. (**dev**; paratype ex QVM 23:15515), *L. dignomontis* sp. nov. (**dig**; paratype NMV-9507), *L. gippslandicus* sp. nov. (**gip**; paratype NMV K-9484), *L. hamatus* sp. nov. (**ham**; paratype ex QVM 23:16073), *L. horridomontis* sp. nov. (**hor**; paratype ex QVM 23:15490), *L. inopinatus* sp. nov. (**ino**; paratype ex QVM 23:16164), *L. johnsi* sp. nov. (**joh**; paratype NMV K-9683), *L. latus* sp. nov. (**lat**; paratype ex QVM 23:17490), *L. macedonensis* sp. nov. (**mac**; paratype NMV K-9512), *L. martini* (Carl, 1902) (**mar**; NMV K-9591), *L. milledgei* sp. nov. (**mil**; paratype NMV K-9606), *L. modestus* Chamberlin, 1920 (**mod**; ex QVM 23:15294), *L. montanus* sp. nov. (**mon**; paratype QVM 23:17716), *L. orarius* sp. nov. (**ora**; paratype ex QVM 23:17693), *L. otwayensis* sp. nov. (**otw**; paratype NMV K-9619), *L. peninsulensis* sp. nov. (**pen**; paratype QVM 23:16171), *L. perporosus* Jeekel, 1984 (**per**; paratype ex QVM 23:17419), *L. plomleyi* sp. nov. (**plo**; paratype QVM 23:15466), *L. tarrabulga* sp. nov. (**tar**; NMV K-9635) and *Tasmanopeltis grandis* gen. et sp. nov. (**gra**; paratype QVM 23:15558). Scale bar = 1.0 mm.

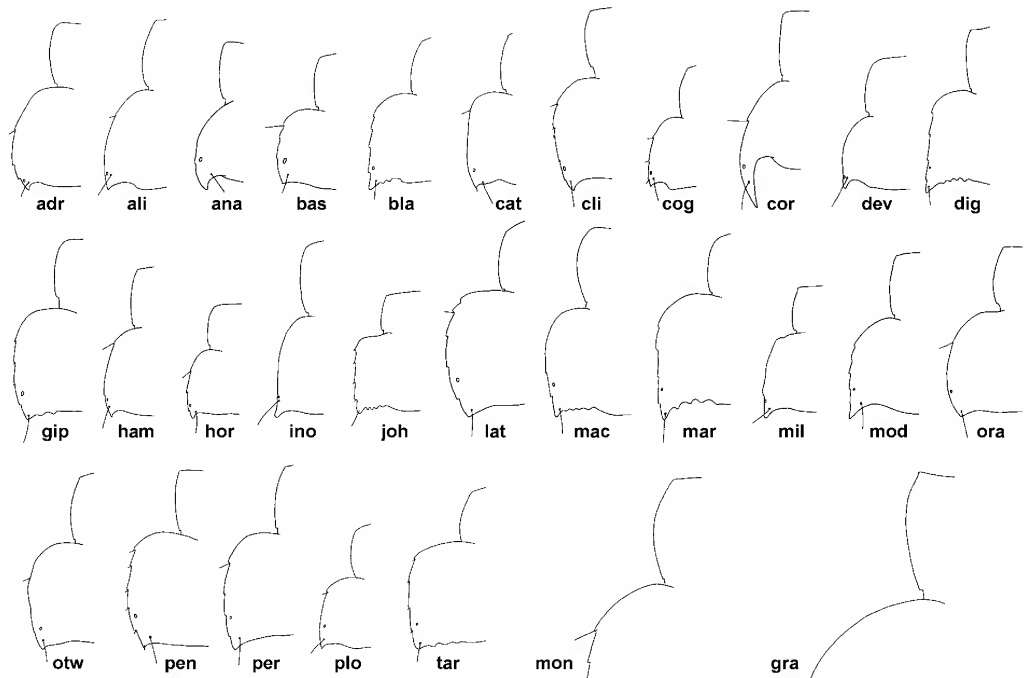


Figure 70. Left side dorsal profiles of segment 12 of male *Lissodesmus* spp. and *Tasmanopeltis grandis* gen. et sp. nov., and of segment 13 of male *L. plomleyi* sp. nov. Species codes and specimen details as in Fig. 65. The ozopore opening is shown as a small ellipse near the paranotal margin in all cases. Scale bar = 1.0 mm.

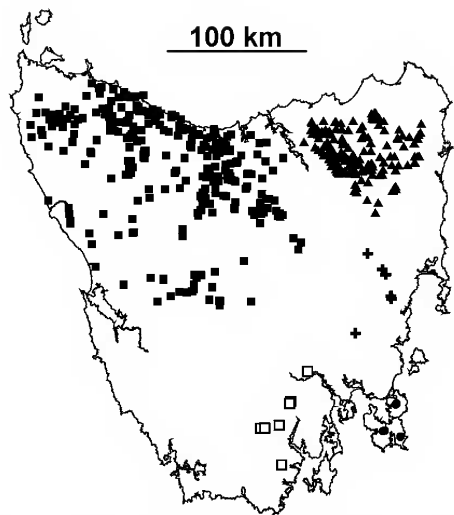


Figure 72. Localities in Tasmania of *Lissodesmus adrianae* (triangles), *L. bashfordi* sp. nov. (open squares), *L. inopinatus* sp. nov. (crosses), *L. peninsulensis* sp. nov. (dots) and *L. perporosus* (filled squares).

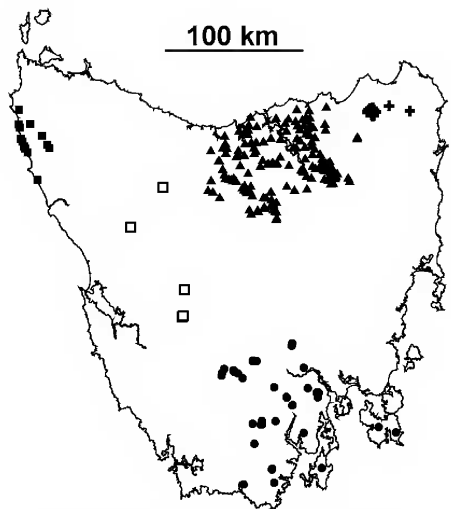


Figure 73. Localities in Tasmania of *Lissodesmus alisonae* (triangles), *L. clivulus* sp. nov. (filled squares), *L. horridomontis* sp. nov. (crosses), *L. modestus* (dots) and *L. montanus* sp. nov. (open squares).

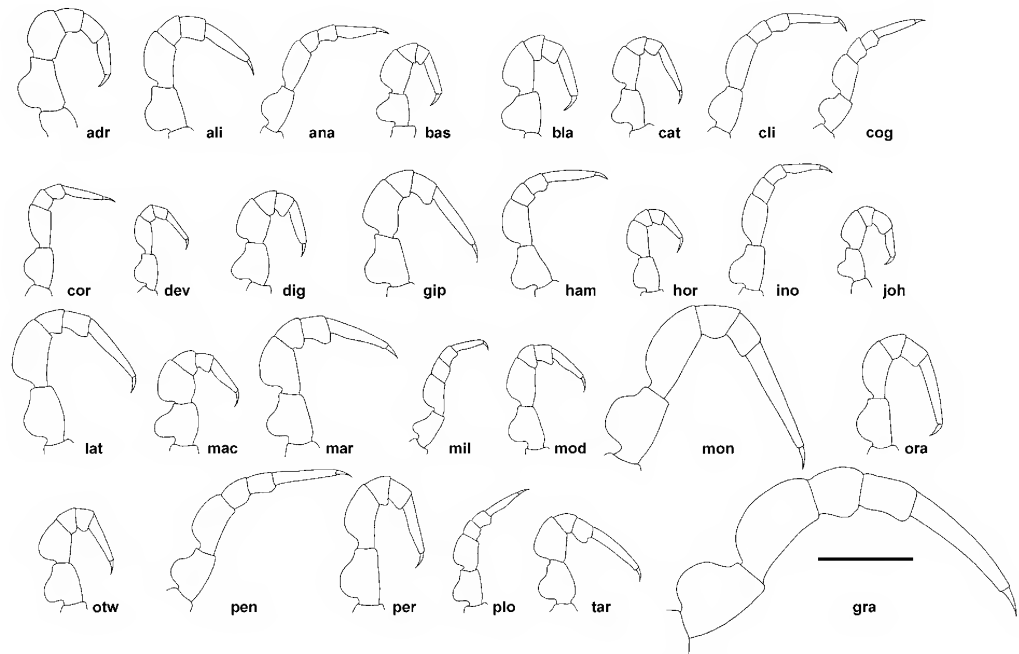


Figure 71. Male leg 7 of *Lissodesmus* spp. and *Tasmanopeltis grandis* gen. et sp. nov. Species codes and specimen details as in Fig. 65, but *L. plomleyi* sp. nov. specimen is paratype QVM 23:15465 and *T. grandis* specimen is paratype QVM 23:15557. Scale bar = 1.0 mm.

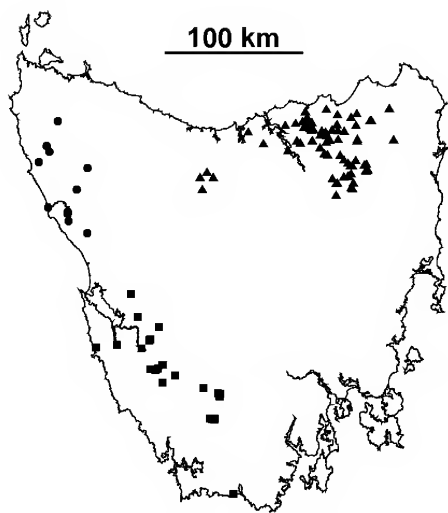


Figure 74. Localities in Tasmania of *Lissodesmus anas* sp. nov. (dots), *L. cornutus* sp. nov. (squares) and *L. devexus* sp. nov. (triangles).

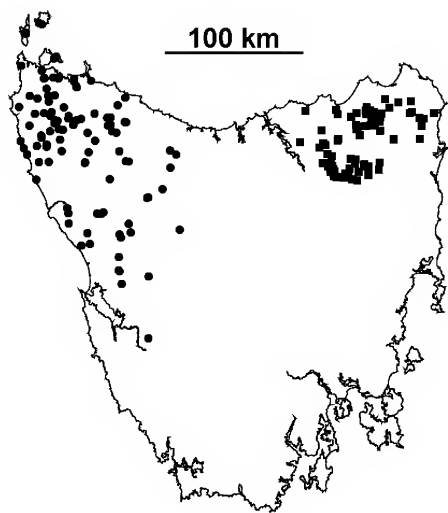


Figure 75. Localities in Tasmania of *Tasmanopeltis grandis* sp. nov. (squares) and *L. latus* sp. nov. (dots).

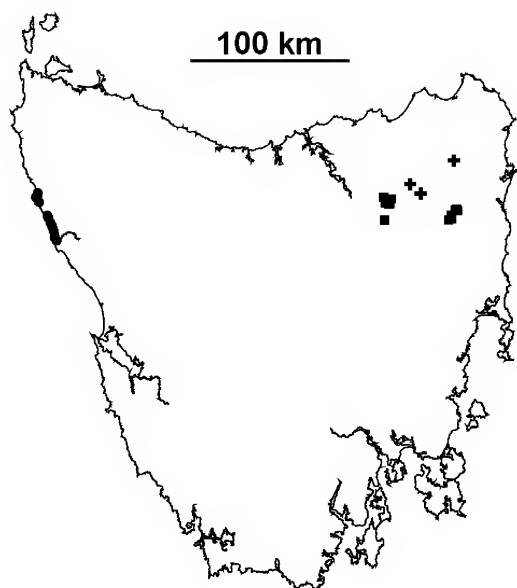


Figure 76. Localities in Tasmania of *Lissodesmus cognatus* sp. nov. (squares), *L. orarius* sp. nov. (dots) and *L. plomleyi* sp. nov. (crosses).

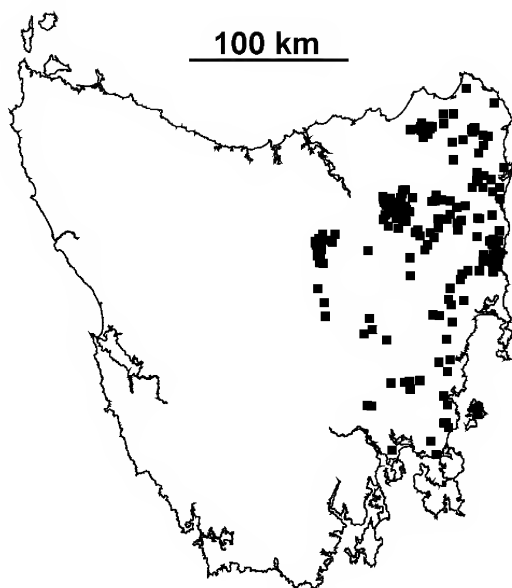


Figure 77. Localities in Tasmania of *Lissodesmus hamatus* sp. nov. (squares).

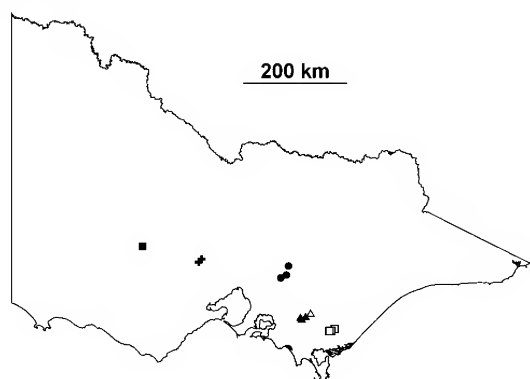


Figure 78. Localities in Victoria of *Lissodesmus blackwoodensis* sp. nov. (crosses), *L. catrionae* sp. nov. (filled square), *L. dignomontis* sp. nov. (filled triangles), *L. johnsi* sp. nov. (open triangle), *L. milledgei* sp. nov. (dots) and *L. tarrabulga* sp. nov. (open squares). For the sake of clarity, some neighbouring localities are marked with single symbols.

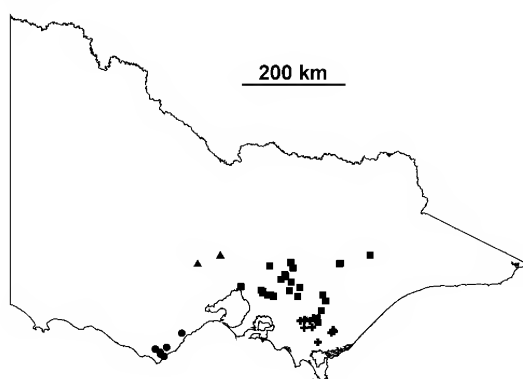


Figure 79. Localities in Victoria of *Lissodesmus gippslandicus* sp. nov. (crosses), *L. macedonensis* sp. nov. (triangles), *L. martini* sp. nov. (squares) and *L. otwayensis* sp. nov. (dots). For the sake of clarity, some neighbouring localities are marked with single symbols.